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Greater Than the Law

Size and efficiency

PUBLICLY owned undertakings supply approximately three-fifths of the electricity sold to the public. The constituents of the Incorporated Municipal Electrical Association are responsible for all but a negligible fraction of the quota. That body is, therefore, recognised as representing the point of view of local authorities, and consequently the views expressed in the annual address of its President carry due weight in official circles.

At the moment, when further legislation is impending, more interest than usual is centred in this address, which has been delivered after the president has had an opportunity during a year of office of weighing up the natural diversity of outlook among the members.

The election of Mr. W. J. Bache to the office for 1937-38 was appropriate. Although his own undertaking sells more than the ten million kWh per annum regarded in the McGowan Report as the minimum justifying independent existence, it is, nevertheless, of a size to give him a natural sympathy with the objections of smaller undertakings to the preliminary proposals of the Ministry of Transport, and at the same time to enable him to preserve a judicial attitude.

It is unfortunate that so ambiguous an expression as "small and inefficient" should have been used in the McGowan Report, as it is capable of being interpreted in a sense offensive to the susceptibilities of many and has led to much bickering that has obscured major issues. While results achieved to date prove in many instances that the two words are by no means equivalent, yet, taken over the country as a whole, the evidence is in favour of larger undertakings, on the basis of tariffs and service to consumers and also (what is of importance for future prospects) of their ability to retain experts to secure potential loads.

On the other side are the value of local initiative and an understanding of local peculiarities—two of the items that call for safeguards against over-centralisation in bigger organisations. Something more than size must determine the desirability of amalgamation.

The objection of the Association to amalgamation goes deeper than this, however. The main opposition is to the acquisition of publicly owned bodies by companies. If there were any prospect of the companies being transferred to a public authority in the near future, it would be illogical, as Mr. Bache says, to hand over local authority undertakings to them and later to compensate them at an enhanced rate on their return to public control.

As against this, it may be argued that the time when companies are likely to be superseded is so remote that any concerns taken over now would have grown by then to such an extent as to make of small account any comparisons between different rates of compensation originally paid.

As more and more ratepayers become relatively large consumers of electricity they will demand the fullest services, caring little whether these services are provided by a municipality or by a company. Given more freedom in the matter, the better the record of a small municipal undertaking has been, the better the bargain it should be able to drive with a power company.

There are many who hold that all that is required of future legislation is that it shall sweep away restrictions imposed by earlier Acts and increase the scope for development by permissive provisions, subject to regulation by the Electricity Commissioners in the widest ultimate interests of consumers. This, however, is not enough. There must be also (whatever the form of administrative machinery that is adopted) a contribution from the electrical industry itself. That contribution must take the form of a more effective co-operation between its various sections.

Whether the suggestion of Mr. Bache that all electrical organisations should be kept in closer touch by being housed in one large building proves feasible or no, it can certainly be regarded as symbolic of the spirit that is essential to progress.

Power Station Practice

THE masterly review of trends in generation presented by Messrs. H. C. Lamb and K. Baumann, at the Convention on Wednesday morning, is not likely to be superseded for some time. Made more effective by the excellence of the summary and the really informative lantern-slides exhibited, it was followed by a discussion of a high order enhanced by the candour of its constructive criticism. Obviously many matters of importance had to be omitted, due to limitations of space and time; but what a nucleus for an authoritative book on the subject! American engineers deserve much credit for their achievements and for the generosity with which they place their experience at the disposal of others. But there is more in it than that. While British engineers may feel just pride that their "dollar efficiency" may usually equal that of America with more elaborate methods, due weight must be given to less favourable capital charges there. Moreover, to secure the same commercial results does not lead to further progress, whereas technical progress provides a new starting point for further commercial gains.

Views on Cookers

WILL the ideal cooker ever be evolved? It seems most unlikely, because ideas vary so much. Recently we published an article by Mrs. N. Dyson Rayner looking at the matter through the housewife's eyes. Two women wrote to us about it. One, a demonstrator, suggested that it was hard enough to sell cookers already without adding more refinements and sending up the cost. The other said, in effect, "Hang the cost! Give us the best you can." In this issue Mr. W. Oliver, of Torquay, deals with the subject from both the user's and the supply undertaking's points of view. He insists that automatic control is needed; that hot plates should be speedy rather than "efficient"; and that replacement should be facilitated by a certain measure of standardisation of parts. He maintains that prices compare favourably with those of gas cookers, and considers that performance must not be sacrificed to appearance. He admits, however, that the ideas of supply engineers on the subject of cookers are widely divergent. What is the poor manufacturer to do? We can only suggest that he does his best according to his lights—a policy which, at least, has succeeded in putting hundreds of thousands of cookers on the mains.

The Quarries

AFTER the end of June the Regulations under the Factory Act governing the use of electricity in quarries will be superseded by a code drawn up by the Mines Department. This will be generally similar to the new Regulations relating to metalliferous mines, except for the omission of sections that are inapplicable, whilst apparatus and cables already in existence are reprieved until July 1st, 1945. As the supervision of quarries and the preparation of reports on them come within the duties of the Mines Department at present, a change over in regard to the Regulations seems logical. Accidents at quarries due to electricity are few, although the standard of installation work is too often not of the highest, and particular attention needs to be given to the electrical equipment of excavating machinery, regarding which an official memorandum was issued two years ago.

For Those in Need

PROSPERITY last year in the electrical industry was unfortunately not reflected in the state of the Benevolent Fund of the Institution of Electrical Engineers. So much to the contrary, indeed, that the accounts for 1937 show a deficit for the first time in the history of the Fund. Perhaps it is because of this general prosperity that the plight of those unable to share in it is overlooked. Yet a scientific body owes much to inventors and others, whose contributions to the wealth of the industry have borne little relation to their incomes or to their ability to provide for ill-health or for the maintenance of their dependants. There are two grounds for criticism in regard to the Fund. The first is that the total amount is meagre, in spite of the generous contributions of individuals; the other is that the proportion of the membership that subscribes to the Fund (31 per cent.) is so very small. Contributions to the Benevolent Fund might well be regarded as part of the cost of belonging to an Institution which provides so many technical and social advantages.

Compulsion for Contractors

FOR many years right-minded electrical men have been agreed upon the desirability of enforcing wiring rules and compelling contractors and wiremen to be registered. The practicability of such a step, however, has been questioned. Yet a special committee set up by the Association of Supervising Electrical Engineers found that such systems were in operation in certain Dominions and other overseas countries, and considered that the institution of similar schemes in this country was practical politics. It is appropriate that the matter has been taken in hand by the A.S.E.E., for its members are the "middlemen" of the contracting industry. They are between the upper millstone of the employers, who want to keep down costs, and the nether stone of the wiremen, who need to be kept up to scratch. Compulsory wiring rules and registration would ease their task considerably and help them to secure the best and safest installations. The outcome of the A.S.E.E. report is the establishment of an influential committee representative of the leading electrical organisations. It is stated that the Government Departments concerned are willing to give help and advice, and the first practical move has been to suggest the inclusion of an enabling clause in the impending Distribution Bill.

Power Staffs' Salaries

IN its May issue the *Electrical Power Engineer* (the official journal of the E.P.E.A.) agrees with us that the N.J.B. schedule of salaries has become an unsatisfactory basis for the remuneration of power station staffs. It draws attention particularly to the fact that while plant capacity was an acceptable "yardstick" when maximum demand ranged between 60 and 80 per cent. of plant capacity, now that many stations are operating at a much higher load factor the staffs are bearing far greater burdens. Moreover, the stabilisation of salaries at a higher level three years ago has been entirely negatived by the rise in the cost of living. Stabilisation at a point high enough to provide for a still further rise in living costs is advocated as the only course open. A more detailed allocation of positions to specific grades is also called for.

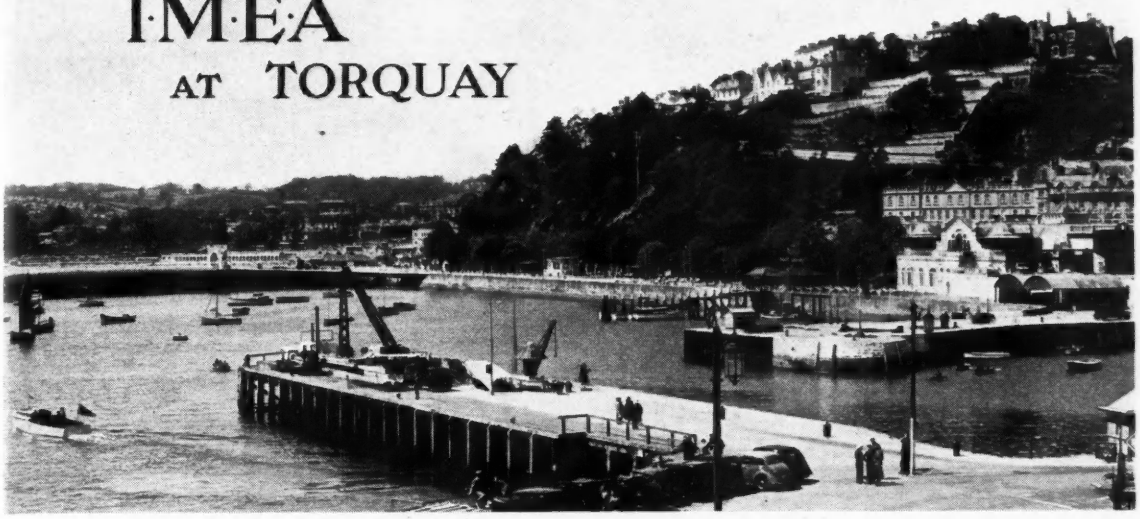
The Wattage Basis

INCREASING costs have led the Hackney Electricity Committee to propose revisions of charges as from October 1st to enable it to meet to the extent of about a half the higher expenditure of the undertaking. Incidentally it is recommended that the assessment of the fixed charge of one of its two-part tariffs on the wattage of lamps installed shall be abandoned. The Committee seems to have discovered at last what has been patent for years: that many consumers, for the purpose of assessment, will install lamps of the lowest wattages with a view to replacing them by larger ones later on. There is another aspect, however. If consumers are honest and retain their low-wattage lamps they are not benefiting the undertaking and are doing themselves harm

Large-scale Depredation

THE theft of electricity is too common in this country, but seldom is it a cause of alarm to supply undertakings. In Mexico, on the other hand, it seems to have reached extraordinary proportions. In its report for the past year the Mexican Light & Power Co. states that it is operating its plant to the limit and is restricting new contracts for the supply of power. It attributes a great part of the "demand" to the increasing thefts, which inflict heavy losses on the company, and states that until steps are taken to repress these thefts and to adjust tariffs it cannot extend its plant.

THE I·M·E·A AT TORQUAY



Reports and pictures from our representatives at the Convention

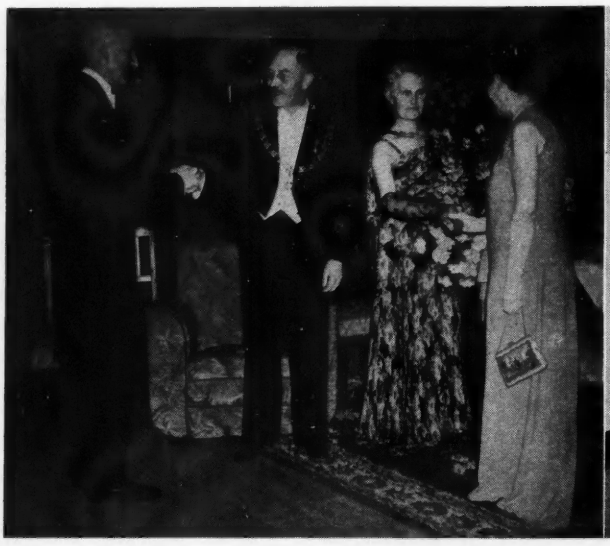
THOSE of the 1,700 visitors to Torquay for the I.M.E.A. Convention who were wise enough to arrive for the week-end found the celebrated resort at its best, with the sunshine and blue sea and sky as good as the posters. Small wonder, then, that as we walked round among groups of delegates that we found little disposition to get down to business before the appointed time and the matters under discussion were not often "shop" subjects.

During Saturday afternoon and Sunday the town began to assume the "Conventional" atmosphere. Well-known electrical men were encountered making the usual Convention "contacts"—the first since Brighton last year. Delegates strolling along the sea front were treated to a "dress rehearsal" of the illuminations which this week are beautifying several of the principal buildings of the town. The esplanade and the quay looked particularly effective picked out with strip lighting. Two or three completed letters of the words "Health and Happiness," arranged around the illuminated coat-of-arms of Torquay on the side of the quay promised well for the "Ediswan" experiment of utilising fluorescent chemical paint and subjecting it to ultra-violet radiation.

High up at the north end of the town the yellow banner of the I.M.E.A. headquarters floated over the Imperial Hotel. This, like the hotel itself, was floodlighted. We are told that for lighting the imposing sea-front façade twenty-six "Mazda-lux Two" projectors with 500- and 1,000-W gas-filled lamps, and two with 500-W flame-coloured "Mazda" lamps are em-

The Mayor of Cheltenham (Ald. Capt. J. H. Trye) opens the exhibition

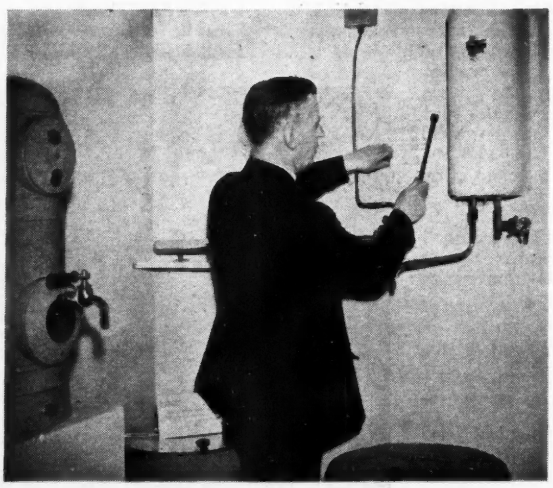
Left: Delegates studying their programmes outside the exhibition. Right: Signing up at the convention office



Mr. and Mrs. Lamb being received by the President. Right: Messrs. J. K. Brydges and E. K. Miller

ployed. Most of the floodlights are on the ground level, with a few on the terrace and roof of the balcony. A very fine effect has been secured by floodlighting the trees with the sea as a background, and a novel impression is created by "floodlighting" with ultra-violet rays a flower-bed of artificial flowers treated with fluorescent paint. There certainly seems plenty of opportunity for the exercise of ingenuity in connection with this new medium for producing unusual illumination effects.

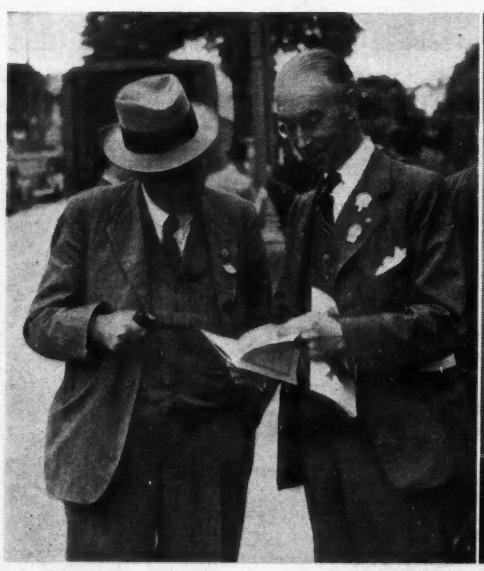
An extra attraction on Sunday was the presence in the bay of the Royal yacht, the *Victoria and Albert*, and a part of the Home Fleet, including the warship *Royal Sovereign* and two submarines. Motor-boat proprietors had a good day giving the visitors a "close-up" of the ships, while delegates were able to inspect the smaller of the submarines, the *Sea Horse*, which had been moored alongside the quay.



Mr. Dale puts the finishing touches to the E.D.A. stand

But while the delegates were able to take it easy, the case was quite the reverse with those poor individuals whose duty it was to prepare the exhibition. Following a Murphy electric vehicle and a Wilson traveling overhead repair van (the latter belonging to the Doncaster Corporation), we came to the garage of the Grey Cars in Torwood Street, where the exhibition is being held.

An ELECTRICAL REVIEW banner, a row of "I'm Electric" symbols and sounds of hammering and sawing directed our footsteps to the entrance, where negotiating the inevitable huge mound of plywood, brown paper, cardboard boxes, shavings, lamp cartons, cable reels and the like, we were surprised to see how well advanced the arrangements were. Usually at this stage some of the stands are still being erected, and it appears an impossible task to get things straight by the following afternoon. As it was, most of the stand work had been completed, except, perhaps, for an odd bit of carpentering here or a touch of paint there. Most of the exhibits



Left: Councillors E. L. Ward and T. E. Waite. Right: Mrs. G. J. Hollyer (wife of the Torquay electrical engineer) keeps an eye on Mr. L. C. Sharp, who is counting the E.I.B.A. "takings"

Caught by the "Electrical Review" photographer at Torquay

1. Mr. and Mrs. Hollyer and Alderman F. Callard. 2. Captain J. M. Donaldson and Mr. A. Ellis. 3. Mr. P. J. Robinson. 4. Mr. and Mrs. Snow Huddleston. 5. Messrs. E. Seddon and S. Ferguson inspecting some floodlighting. 6. Messrs. A. Nichols Moore and R. W. L. Phillips. 7. The Mayor of Carlisle, Mr. C. W. Salt and Alderman Walker. 8. Messrs. F. Forrest, W. J. Bache and H. C. Lamb, past, present and future presidents. 9. Mr. and Mrs. W. M. Selvey. 10. Mr. S. Ferguson and Mr. and Mrs. V. Watlington examining the sundial on the promenade. 11. Mrs. J. W. T. Townley, Mrs. H. B. Vorley and Mrs. Forrest watching their husbands being photographed for the official picture. 12. Alderman S. E. Jackson, J.P., and Mr. J. W. Simpson

A part of the large gathering at the dance following the President's reception on Monday

were already in their places, and the only problem remaining appeared to be a general tidying-up.

The President, Mr. W. J. Bache, set a good example to delegates by paying an advance visit to the exhibition on Sunday morning. Among other early arrivals who looked in to see how things were getting on we noticed Mr. E. E. Hoadley (Maidstone, hon. sec. of the I.M.E.A.), Mr. E. Seddon (Edinburgh) and Mr. A. J. Ryan (Hastings).

Manufacturers appear to have taken even more trouble than usual this year to produce an interesting and thoroughly up-to-date display, and it is to be hoped that delegates will take advantage of this opportunity. Apparatus design is now changing so rapidly that representatives of electricity undertakings must see this collection of the latest developments.

The attendance on Monday seemed to indicate the visitors' awareness of the importance of the show, for all day the hall was practically full. True, most of the delegates came primarily to obtain their badges from the Convention offices, but, having registered, few left without, at any rate, a quick look round the stands and many stayed to inspect thoroughly items which particularly interested them. Whether their stay was long or short, we doubt if any evaded the hungry collecting boxes of the E.I.B.A. flag sellers.

All nicely tidied up, the exhibition revealed itself, so the President remarked at the opening ceremony on Monday afternoon, as one of the best ever staged by the I.M.E.A. With its wide gangways, giving easy access and unobstructed views of the exhibits, few will disagree with this description, and we cannot help contrasting it with the last I.M.E.A. Exhibition held at Torquay nine years ago, in what we believe was a small, disused hospital.

The general arrangement of the stands and the lighting effects were strongly praised by the Mayor of Cheltenham, Ald. Capt. J. H. Trye, when he opened the exhibition. Interest in the exhibition, he said, was growing every year, and he hoped that the efforts of the ninety firms exhibiting would not be wasted and that the exhibition would help to bring home the fact that electricity was the friend of man. Delegates would find almost every type of equipment represented, and every visitor would find there something of particular interest to himself or herself. Votes of thanks to the Mayor of Cheltenham and also to the President for taking the chair were proposed by the Mayor of Torquay, Alderman the Reverend Isaac Pugh.

We give on another page a review of the developments in domestic apparatus to be found at the exhibition. Items which appeared to attract a great deal of attention were the E.D.A. display of manufacturing developments; the composite exhibit of the Electric Vehicle Committee, in particular a Murphy invalid chair; the Rubery Owen cooker, with its cylindrical oven; the Pyrotenax fireproof cable, and two "stunts" by Ediswan and Siemens. These "stunts"—this is scarcely the correct term to use for we foresee considerable commercial possibilities in them—consist of further applications of fluorescent materials and ultra-violet radiation, to which we have already referred in connection with the outdoor illumination schemes. The "Ediswan" exhibit consists of posters and artificial flowers which have first been painted with natural oil colours and then treated with fluorescent pigments which only become visible when "Escura" ultra-violet ray lamps concealed behind pelmets are switched on.

The colourings produced of almost unbelievably bright and

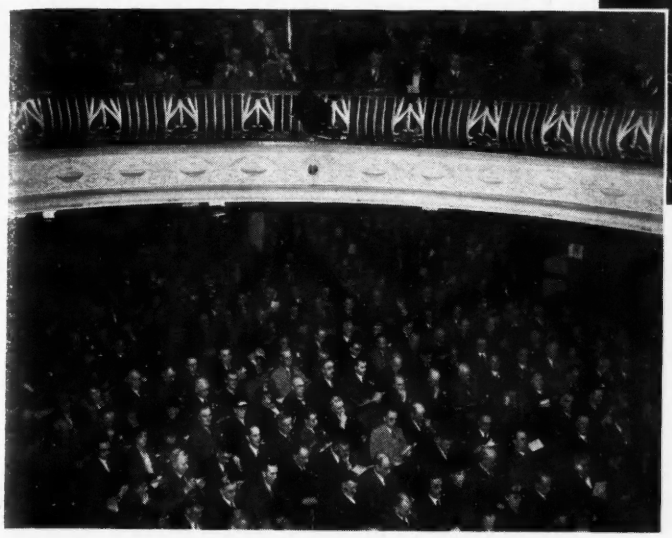
Left: The President and Mrs. Bache examining a wash boiler. Right: Mr. J. W. Simpson, Ald. Sir Percival Bower, the Mayor and Mayoress of Torquay, Mr. and Mrs. Bache, the Mayor and Mayoress of Cheltenham and Mr. E. E. Hoadley on the E.D.A. stand

Mr. E. A. Mills (Hackney) with two members of his Council looking at the window display outside the exhibition

of quite a different character from anything produced by means of ordinary lighting. The idea, of course, is not particularly new but it is the recent development of the "black" lamps which have enabled the costly quartz u.v. apparatus to be dispensed with and made the scheme an economical proposition. In the Siemens exhibit various pieces of apparatus, including a lamp standard, an iron and a hairdryer, have been treated with fluorescent substances and are viewed under rays from a "Sieray" u.v. lamp.

A gramophone record has been made by "The Girl with the Golden Voice" to describe the merits of the new "Chameleon" fireplace which forms the principal "Magicoal" exhibit.

The weather on Monday after a doubtful start brightened



up in the afternoon and the sun appeared spasmodically. It was much cooler than on Saturday but a lower temperature tends to improve attendance at the business meetings and the exhibition.

Monday evening's reception by the President and Mrs. Bache at the Town Hall was marred by one unfortunate occurrence. In coming down some stairs the Mayoress of Bedford slipped and broke her ankle. Apart from this misfortune the evening was a most enjoyable one for the 1,500 guests present, who besides dancing were entertained by a cabaret performance presented by the Fol-de-Rols Concert Party under the direction of Mr. Arthur Askey, of B.B.C. "Band Wagon" fame. During the performance yet another example of fluorescent lighting effects was provided by apparently turning four dancers in ordinary stage frocks into negresses in parti-coloured costumes.

A steady downpour of rain hastened the footsteps of the delegates on Tuesday morning on their way to the Pavilion for the opening session of the Convention. Proceedings were opened by a warm welcome to the town of Torquay by the Mayor. Before giving his presidential address, Mr. Bache proposed that a loyal greeting from the Convention should be sent to His Majesty the King, and also that a message of sympathy should be sent to the Mayoress of Bedford. Both these suggestions were heartily approved.

Other matters than business were discussed. Messrs. W. J. Jones, F. Swarbrick, J. W. Perkins and V. W. Dale

The address, while containing plenty of food for thought, was rather less formal in the method of presentation than is usual at such functions and the general opinion seemed to be that it was among the best of recent years.

The President delivering his address and (left) part of the well-packed hall

The housing of all the different organisations connected with the electricity supply industry in a single block of buildings as one step in securing further co-operation in the industry was a practical proposition which obviously appealed to the delegates. So, too, did the suggestion that pressure should be brought to bear on builders to provide houses equipped for uses of electricity other than lighting.

Mr. Bache's view that any further increase in prices or in the cost of labour was unlikely to interfere with the normal reduction in generating costs no doubt brought a ray of comfort into the lives of many of his listeners.

Mr. R. Lee (St. Pancras) being decorated by an E.I.B.A. flag-seller

Although it might have been thought that the Government's continual postponement of its Bill for the reorganisation of electricity distribution might have pushed the matter slightly into the background, it was obvious from the reception accorded the President's remarks on the subject that it still remains by far the most vital problem facing the supply industry.

In view of the interest in air raid precautions the afternoon paper by Mr. E. E. Hoadley and Mr. H. Purslove Barker on "Automatic Central Control with Reference to Street Lighting," attracted a good audience.

Of particular interest in connection with this subject is a special exhibit which Standard Telephones & Cables, Ltd., have arranged at the Scala Hall in the form of a miniature town with street lighting, A.R.P. alarms, water heater points, &c. Under this company's system a d.c. bias is given to the supply lines from a 6-V battery, the various signals being sent out by a small battery of contactors actuated from a master controller. The detectors, consisting of a transformer and relay, are extremely small and compact.

While the menfolk were listening to Tuesday afternoon's paper the ladies had an opportunity to hear a talk by Mrs. F. Forrest, vice-chairman of the Electrical Association for Women, on "Light and Colour in the Home." Afterwards they were entertained to tea by Mrs. W. J. Bache.

Attendance at the exhibition was again quite good on Tues-

day. A few more electric vehicles arrived and the outside display included the Jackson electric cooking demonstration coach and a Berry van for displaying additional examples of "Magicoal" fires and lighting fittings. A van containing specimens of Sanders switchgear was also touring the town.

Practically all day an aeroplane soared over the town telling us that "Aberdare Cables greet the I.M.E.A.," and every now and then we came across an army of sandwichmen dressed as chefs assuring us of the advantages of the English Electric "Ritemp" thermostatic oven control.

We found time to-day to look in at the Queen's Hotel, where Johnson & Phillips have arranged a special display of their power factor correction equipment, circuit-breakers, switch and fuse gear, and water heaters. Visitors appeared to be paying special attention to a 1½-gal. model "Charlton" water heater. On investigation we discovered that it was delivering beer in-

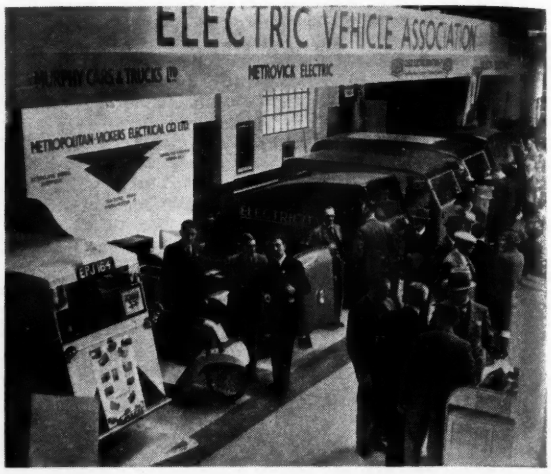
At the Mayor of Torquay's reception

stead of water, but we understand that this is not a standard feature.

We also had a glance at the Scala Sports Hall, where Simon Electric Floor Scrubbers are demonstrating their machine. The wooden floor here has a four-year's coating of dirt and the fact that the machine will wash, scrub and dry 45 sq. ft. in a minute speaks well for its performance.

Another pleasant evening was spent on Tuesday at the Town Hall, where the delegates were guests of the Mayor and Mayoress. Dancing continued until 1 a.m.

As expected, Wednesday afternoon's discussion on the Government's proposals for the reorganisation of electricity distribution was not lacking in speakers. As reported on another page, there was plenty of constructive criticism of the proposals and it is to be hoped that those Government officials



The electric vehicle display

responsible will take due note of them before committing the country to a scheme which may not prove to its best interests in the long run. Before the discussion those present stood in silence as a tribute to the late Mr. G. Scott Ram, whose death we report in this issue.

Those who could tear themselves away from the discussion went later in the afternoon to Torre Abbey to a garden party given by the chairman and members of the Torquay Electricity Committee. Most of the delegates had noticed the Abbey before in the distance as an example of the G.E.C. floodlighting but this was the first time they had seen the buildings and grounds at close quarters. It is an ideal setting for such a function as this and everyone was sorry when the time came to leave.

Thursday's proceedings commenced with Councillor F. E. Sugden's paper on "Hire-purchase Law and its Application to Municipal Electricity Supply Undertakings"—a subject that is very topical just now and calculated to arouse a good deal of interest. The afternoon paper by Capt. J. C. Chaytor was on the subject of air conditioning.

On Friday the Electrical Association for Women is holding a luncheon at the Town Hall with Councillor Mrs. Gregory, chairman of the National Executive Committee, presiding. The toast of the E.A.W. is to be proposed by Mr. Bache and Mrs. V. F. Gresham, president of the Torquay Branch of the E.A.W., will respond. The Mayor of Torquay will welcome the Association to the town. After lunch the E.A.W. members will visit Dartington Hall.

At the annual banquet and ball to be held on Friday evening yet one more example of "black light" is promised.

On Saturday morning following a meeting of the I.M.E.A. Council the general meeting of the Association will conclude the Convention proper and the afternoon will be free for delegates to avail themselves of one of the motor-coach trips arranged. A visit to the "Fol-de-Rols" Concert Party at the Pavilion has been arranged for the evening.

1. Ald. the Rev. and Mrs. Longbottom. 2. Messrs. E. E. Hoadley and W. J. Bache. 3. Standing: Miss C. H. Bache, Miss C. Haslett, Miss J. F. Bache, Councillor Mrs. E. Gregory and Mrs. F. Forrest. Seated: Mrs. W. J. Bache and Mrs. V. F. Gresham. 4. Mr. F. W. Purse

The Presidential Address

Mr. Bache's views on current questions

The importance of co-operation between supply authorities and other sections of the industry was stressed by the President, who revived the suggestion of an electrical headquarters in London. He also referred to rising costs and means of combating them and to the impending Distribution Bill

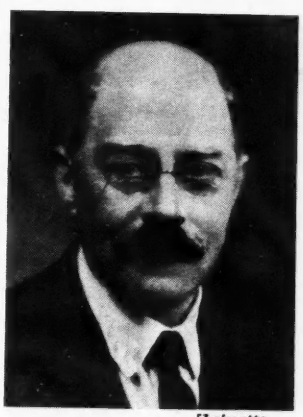
IN the early part of his presidential address Mr. W. J. Bache stated that the membership of the I.M.E.A. now includes all but twenty-four of the municipally owned undertakings in the country, those outside selling only 15 million kWh between them, or about 0·15 per cent. of the total sold by local authorities. The Association is regarded as representative by the Government and other bodies, but that position will be maintained only if it continues to show a sense of responsibility and a realisation of actualities.

Increases in the prices of materials have recently caused concern. The most serious is that of coal, prices varying widely between different undertakings, some having suffered to the extent of 25 to 35 per cent. in the last three or four years, while others pay up to 100 per cent. more. Not only price but amount and quality of supplies is in question. As the problem affects other public utilities, a conjoint conference has been set up under the chairmanship of Mr. W. B. Woodhouse and has effected some improvement.

Discussions with the Cable Makers' Association have been initiated by the Council with a view to securing lower prices for cable through the standardisation of types and sizes and a modification of cable specifications. Apart from these investigations, however, a reduction in schedule prices is held to be justified. Consultations with the meter makers' organisation it is also expected will affect prices satisfactorily.

The permanent joint committee of the I.M.E.A. and B.E.A.M.A. has proved so successful in removing possible sources of friction that a similar joint committee has been formed with E.L.M.A. While long life, efficiency and maintenance of performance of lamps are important, two other factors have arisen; one is the low-priced electricity obtainable with a two-part tariff and the other the increased use of electric light by weekly wage earners. The quality lamp makes no appeal to such consumers, who purchase cheap lamps from stores. This enormous and growing market would, if recovered, reduce the sum of nearly £200,000 paid for imported lamps which bring electricity into disrepute.

Similar contact has been established with the E.C.A. Supply authorities hold that their vigorous development policy and extensive publicity create a public demand that brings more work and profit to the contractors. Moreover, supply authorities are not the only competitors of contractors as there are also builders, ironmongers and department stores that engage in electrical installation work. It appears probable, however, that some solution will be found.



[Lafayette
Mr. W. J. Bache, President, I.M.E.A., 1937-38

The fruitful results of consultation with these and other bodies leads to the suggestion that the different organisations within the electrical industry should be housed in one block of buildings within or near the rectangle bounded by Kingsway, New Oxford Street, St. Martin's Lane and the Strand. There are seven leading associations representing the supply side, three the manufacturers, two the contractors, two research and one propaganda. This list is exclusive of the I.E.E., which as a professional body should remain independent.

An Electrical Headquarters

In addition to accommodation for the staffs and committees, laboratories and demonstration rooms of the constituent bodies, three assembly halls would be required for audiences varying from 50 to 500 and a site of not less than 40,000 sq. ft. would have to be acquired, on which to create a six or seven-storey building. There would probably be no difficulty in financing such a scheme, but the I.M.E.A. could not take a leading part in it, in view of the uncertainty of its position until more is known about the Government's Distribution Bill. A headquarters building of this kind would provide an opportunity for demonstrating how electricity can add to convenience and health in an office well lighted, noiseless, with a comfortable atmosphere that is independent of external meteorological conditions, with electrical devices to facilitate business.

A further step would be the setting up of a General Co-ordinating Committee for the electrical industry in line with the proposal made at the National Electrical Convention of 1935 and with the suggestion made by Dr. C. C. Paterson in his recent presidential address to the E.R.A.

Much work has devolved on the Council of the I.M.E.A. in connection with the interpretation and application of the Electricity (Supply) Act, 1926. Regional grid tariffs have been paid for ten years, and consideration should now be given to the modifications in method and amount that can be introduced in the tariff in the second decennial period. Existing tariffs were fixed when the construction of the grid was in progress and were influenced to some extent by local circumstances, but it should be possible to fix a uniform tariff for the whole country for the second ten years, materially lower than any of the present tariffs, owing to increasing efficiency of operation and lower costs of production with increasing use of the largest generating sets, improving load factor and securing unified control.

There is a possibility of a further rise in the costs of labour and commodities but it seems unlikely that either will seriously interfere with the operation of the three main factors in reducing costs mentioned. The relatively high standard of wages maintained by the National Joint Industrial Council is justified by the high degree of skill required and the arduous duties in many sections of the work.

A reduction in distribution costs is as important as lower production costs. This can best be secured by increasing the number of kWh sold in relation to capital outlay on the distribution system. There is still much room for educational work in the domestic field. Too many builders and architects still regard wall sockets and power circuits as a luxury only to be provided when insisted on by the owner. Yet in many undertakings (*e.g.*, Cheltenham) a large proportion of new connections of cookers and water heaters is in houses of under £40 a year rental. The number would be greater if the kitchens were bigger for often the cooker has to be smaller than is really needed. For the same reason refrigerators, wash boilers and washing machines cannot be accommodated.

This problem of kitchen planning is being studied by E.D.A., whose work benefits every undertaking in the country whether it subscribes to its funds or withholds its due share of the cost of its work. The same is true in respect of the E.R.A. and the B.S.I.

With regard to the impending Distribution Bill, some measure of reorganisation is justified and may involve the amalgamation of certain undertakings. There is, however, a widespread feeling that the proposals outlined in the McGowan Report and in the "White Paper" do not deal fairly with the rights and privileges of municipalities. The repeated reference in the former to "small and inefficient" undertakings has been regarded as an unmerited slur and proposals for amalgamation must, therefore, be based on considerations other than size.

Another feature in the McGowan Report and in the White Paper that has caused dissatisfaction is the differentiation between the terms of purchase of local authority and of company undertakings. The Report recommends that compensation for loss of future profits should be allowed in the case of companies but not in the case of local authorities. If a municipal undertaking makes a surplus above a statutory limit, based on outstanding capital only, it must reduce its charges to its consumers, whereas a company may maintain its charges and distribute the surplus among its shareholders, on the basis of the whole capital.

The Report excludes all consideration in the purchase price of the right of local authorities to apply profits to the relief of the rates. This may not be a desirable practice, but the right to do so, even if it be not exercised, is a valuable one contributing to the general credit of an authority and influencing the price it pays for its loans. A set form of terms of purchase should be drawn up for use between buyer and seller, irrespective of the previous method of financing.

In the opinion of the Association public utility undertakings should remain under public control. While existing companies when ultimately transferred to a public body will be entitled to fair compensation, it would be illogical and uneconomical to transfer local authority undertakings to them and later to pay the companies, when these are eventually absorbed, compensation on an enhanced expenditure.

In initiative, enterprise, efficient management, in their tariffs, and in the extent of qualities and services rendered to the public, local authorities compare favourably with companies.

Street Lighting Control

The advantages of the ripple system are investigated in this paper read on Tuesday

STREET lighting can be controlled by a separate cable system, by pilot wires, by hand or time switches, or by light sensitive cells. None of these methods satisfies the authors of this paper, Messrs. E. E. Hoadley (Maidstone Corporation) and H. Purslove Barker (Actadis, Ltd.), who review the several methods mentioned, basing their objections on such deterrents as expense, unreliability of one kind or another, disturbance to streets involved in cable laying, and inconvenience.

After investigating a system of centralised control in use in France similar schemes have been adopted at Maidstone, whereby 1,369 street lamps are switched on and off by relays actuated by high-frequency ripple signals, which are superimposed (at the main generating station) on the whole distribution network. When street lighting is resumed next season in the various villages round Maidstone the number of lamps so controlled will be increased to 1,600 over an area of 70 sq. miles (see ELECTRICAL REVIEW, December 17th, 1937, p. 850).

[*F. Hopwood* [*Meadames Morter*

Mr. E. E. Hoadley (hon. secretary, I.M.E.A., and borough electrical engineer, Maidstone) and Mr. H. Purslove Barker

The authors concede that the earth return system as a whole has the merit of low first cost, and that, although it is not a centralised system in the true sense of the word, it finds its best applications in networks where the number of sub-stations is small. In practice the experience of this method has been very variable, and a number of undertakings regard the principle with disfavour.

The d.c. bias method of localised control is analogous to the earth return in that one transmitter is required in each sub-station, and to effect a true centralisation of control it is necessary that the sub-stations should be linked by pilot wires. Technically, this system is much superior, except that it cannot be applied to d.c. networks, since the superimposed signal takes the form of a d.c. bias which is applied between phase and neutral at each sub-station, only for a few seconds, displacing the phase-to-neutral voltage towards the positive or negative, thereby providing two types of signal, one for "on" and one for "off."

How the Ripple System Works

Most of the demerits of other methods are avoided by the a.c. ripple principle, which permits push-button control from one central position (see ELECTRICAL REVIEW, May 13th, 1938, p. 684). With frequencies from 300 to 800 cycles from six to twelve signals can be provided, one for each operation desired. Since the signal frequency is much higher than that of the load, it can be impressed on the high-voltage network at a voltage as great as 10 per cent. of the 50-cycle voltage, although 6 to 8 per cent. suffices; that is, 750 V on an 11-kV network. The result is to ripple the system wave form, but not sufficiently to affect the consumers' voltage.

The installation at Maidstone is unique in that it is the only ripple transmitter in the world designed to transmit on an a.c. and on a d.c. network. This has made the scheme considerably more complicated than most. The reception relays normally used do not operate instantaneously, but are in effect high frequency motors, which require the actuating ripple to be sustained for some seconds, so being insensitive to transient disturbances on the network. These relays comprise a tuned circuit consisting of a condenser with or without a choke, which admits the ripple frequency to the relay mechanism, but not the 50-cycle voltage, and a vibrating reed motor.

The ripple signal energises an electromagnet having two armatures in the form of flat strips which are tuned mechanically to vibrate like tuning forks at the particular ripple frequency which the relay is designed to receive, one reed vibrating only to the frequency corresponding to "on" and the other to that corresponding to "off." These reeds carry at their extremities flexible pawls that rest on miniature toothed ratchet wheels, so that when one reed is set in vibration by an incoming signal, its corresponding ratchet wheel is rotated and in so doing pivots a mercury contact through a reduction gearing. When the opposite signal at a different frequency is received, the other reed commences to vibrate, and swings the contact in the opposite direction. Ordinary mercury in glass contacts are used, rated at 10 or 20 A breaking capacity.

At the moment there are between fifty and one hundred networks in the world equipped with centralised ripple control, embodying the principles already described.

Savings in Labour and Maintenance

The cost and type of the ripple transmitter do not depend on maximum demand *per se*, but primarily upon the number of outgoing high-voltage feeders and the arrangement of the generating station.

Any proved system of centralised control (whether using pilots or ripples) is superior both in economy and result to independent control by hand or clock switches, particularly in times of fog or war since service can be given at a moment's notice. It does not employ any apparatus in the lamp columns having continuously moving parts; there is no mechanical wear and no routine maintenance is required in the reception relays. The direct savings in labour thus effected pay nearly the whole of the standing charges on a complete centralised ripple control equipment.

With centralised control the number of hours per annum which the average lamp will be alight may in most cases be reduced by 3 to 5 per cent. or more, since the switching times can take advantage of shorter hours of lighting required in clear weather. This means an equal reduction in the cost of lamp maintenance and it was calculated by one undertaking having about 2,000 lamps that the savings under these headings alone amounted to nearly £250 per annum.

Discussing the value of ripple control for quickly extinguishing street lamps and for disseminating warning signals in connection with air raid precautions, the authors suggest that the best possible method is the discriminatory one in which the personnel can be reached *individually in their homes* by means of centralised ripple control.

The dissemination of such alarm calls by the ripple method is already being widely practised abroad, and a typical combined relay and warning bell unit, which can be plugged into any socket, comprises a ripple reception unit designed to operate only on a selected alarm frequency. The operation of this relay starts a bell which continues ringing until switched off manually. Similar warning units could be hired out to the public at nominal rentals so that they could receive an air-raid warning at the same time as A.R.P. workers.

Many would-be users of off-peak supplies have been deterred by the fact that for several months in the year such supplies would be interrupted *every* day in the late afternoon and early evening, as it has been necessary for the undertaker to protect himself against the incidence of an increased peak load, whenever it might occur. By the use of centralised control the way has been made much easier for the consumer and much greater business of this character should accrue to the supply authority. A low tariff for this class of load can now be offered, and the only proviso to be made would be that the supply would be always available save for short interruptions, which annually would not exceed a stated maximum.

Discussion

Mr. McKenzie opened the discussion by stating that there was experience in this country of some 100 street lighting control systems employing probably 10,000 relays, but the economics of the situation must be taken into consideration. Had the placing of a resistance in series with the neutral been approved by the Electricity Commissioners? Also, what about possible malicious interference with the d.c. bias system and the possibility of upsetting discrimination? To reduce the amount of power needed to inject the ripples, the authors used a good deal of costly auxiliary equipment. If lower voltages were injected the relays could be made more sensitive.

Mr. J. K. Brydges (Eastbourne) stated that during the last six weeks he had installed in his undertaking a master controller in the generating station for the purpose of controlling three transmitters in sub-stations that were hitherto actuated by time switches, and so far it had worked very well. He

employed the phase-to-neutral connection and consequently had found it very important to ensure a good return circuit. In some cases the service connections to street lamps which had been in the ground for years had to be removed and replaced by lead-covered cables. What would happen if the ripple generator failed, since it was not duplicated on account of cost? He used the A.T.M. system of control, which was not expensive by comparison with the costly system at Maidstone.

Mr. E. M. WcWhirter (Standard Telephones & Cables, Ltd.), referring to the d.c. bias method, emphasised that resistance was only in series for just one cycle and the Electricity Commissioners had seen it in operation and approved of its use. All systems could be interfered with maliciously, but perhaps with more difficulty in some cases than others. Other systems had been proved to work satisfactorily and there were arguments for localised operation. Oil-filled chokes, large insulators, &c., were needed when the h.v. network was used to convey the signals to the l.v. distributors. But bias could be imposed just as easily and more cheaply, while pilots had been proved by telephone operation to be very reliable. It was fundamentally wrong to attempt to reduce the power available for signalling when it could be obtained so cheaply and reasonably by utilising d.c. bias. Harmonics could be sustained and so were capable of causing false operation of ripple apparatus.

Mr. E. E. Jolly (Bethnal Green) considered that the connection of street lighting to ordinary mains should be discouraged in favour of separate feeders, since load fluctuations caused lamps on the present system to be over- or under-run.

Mr. Bernard (E.D.A.) stressed the importance of relay design, considering that this was the hard core of the ripple control system.

Mr. E. A. Logan explained that at Erith the earth return system had been tried but failed on account of the large number of spasmodic earths which occurred on the system, many of them due to wireless sets and other causes over which the supply authority had no control. Erith was the first area in this country to employ ripple control for sub-stations, though not on the centralised system, and it had worked very well.

Mr. W. F. Russell (Lichfield) said that the type of control to be employed was governed by the size of the undertaking to which it was to be applied. The ideal would be one that could be centralised and decentralised at will. D.c. bias could be employed to control other things besides street lighting, if two signals were used, and the relays could be made to discriminate between true and false signals.

Mr. F. C. Orchard (Hornsey) spoke of the d.c. bias system, and made a plea for simplicity, remarking that the duplication indicated on the authors' diagrams seemed to show that they did not have any strong faith in their system.

Mr. L. C. Sharp (Venner Time Switches) indicated the reaction of time-switch makers by stating that when the ripple signal method became commercially and technically sound it might then be considered the best means of control.

Mr. H. Purslove Barker, in reply, said it seemed to be the general experience that for earth-return systems continuity bonding was essential. If resistances were used in series when the network was out of balance there would be voltage drop and flickering of the lamps. The suggestion that malicious interference with the signals was possible was frivolous, since the apparatus that would have to be used for that purpose would be too costly. It would be too costly also to install local systems on a network having 200 sub-stations, which was not an unreasonable number. injection of lower voltages would necessitate more sensitive relays, which would reduce reliability, since they could not be made so robust. The amount of work that had been done with ripple control could not be minimised. Something like a quarter million were controlled in this way.

Mr. E. E. Hoadley said that the cost of the ripple system installed at Maidstone would be covered by the savings.

Power Station Practice

An outline of present-day trends in Great Britain and the U.S.A. was given in Wednesday morning's paper

THIS paper is based to a large extent on observations made by Mr. H. C. Lamb (Manchester Corporation) and Mr. K. Baumann (Metropolitan-Vickers Electrical Co., Ltd.), in America in 1936 during the World Power Conference. At the same time they refer to British power station practice, to indicate the general trends in both countries. Brief particulars are given of the plants visited in America as well as of the high-pressure installations of the Ford Co.'s Dagenham station, the London Power Co.'s Battersea plant and the new installation of the North Metropolitan Co. at Brimsdown. The last-mentioned consists of a two-cylinder primary turbine driving an 18,000-kW 33-kV main generator and a house generator of 1,600 kW at 3,000 r.p.m. This exhausts into a 34,000-kW, two-cylinder condensing turbine driving a 31,000-kW 33-kV main generator at 3,000 r.p.m., and, through gears, two 1,050kW house generators. The initial steam conditions are 1,900 lb. per sq. in. at 930 deg. F., reheating of the steam being carried out between the primary and condensing turbines at about 200 lb. pressure by means of a steam reheater and a flue gas reheater. The two Loeffler boilers will normally be operated as one unit, without stand-by.

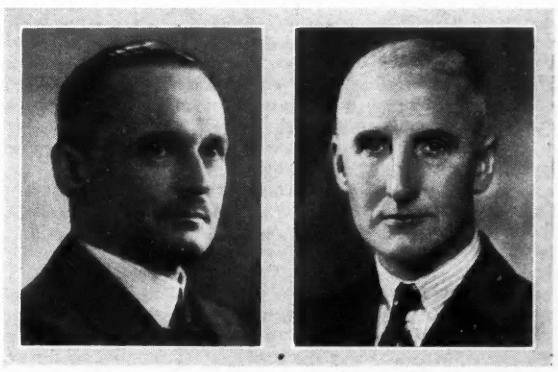
The total energy generated in America in 1936 amounted to 113,373 million kWh compared with 21,650 million kWh in this country. These figures represent an American increase since 1921 of 177 per cent. against 345 per cent. in Great Britain. During the same period the actual increase in electricity generated per head of population has been greater in America, the present figure being still nearly twice that in this country.

Comparative Costs

The respective overall average costs to the consumer in America are 1.15d. per kWh for the year 1936, as against 1.125d. in this country. In America some 64 per cent. only of the total kWh generated is produced in fuel-burning stations, the balance being produced by water power. The average coal consumption per kWh generated has for many years been lower in America, although the difference in 1936 was only about 2 per cent. The average calorific value of fuel used in American stations is higher than in this country, so that, having regard to the larger average station capacity and better cooling water conditions there, British results compare advantageously with those in America.

Owing to the industrial depression, few plant additions of large capacity have been made in America since 1932, the most notable being the Milwaukee Electric Railway & Light Co.'s Port Washington plant, which is the most efficient plant existing. An important characteristic of this plant is that it is one of the few of the "one boiler one turbine" type. This simplifies the steam piping, and particularly facilitates the application of reheating.

Reheating is again being revived. Apparently, in view of the relatively small economy possible, *i.e.*, about 5 per cent.,



[Lafayette

Mr. K. Baumann and Mr. H. C. Lamb (city electrical engineer and manager, Manchester)

it would ordinarily only be justified where very high pressures were adopted and where excessive wetness of the steam, in the low-pressure end of the turbine, would result in wear of the blades. The permissible wetness in America is now about 12 per cent., with a tendency towards 13 per cent. In this country, the peripheral speeds of the last blade rows of turbines are relatively lower than in America and the erosion for a given wetness is considerably less.

Great Britain has lagged behind in the adoption of higher pressures, but up to 1935 had progressed more generally so far as temperature is concerned, the object being to raise the pressure in line with the temperature in such a way that the wetness in the exhaust of the turbine would not exceed 12 to 13 per cent. without reheating.

During the industrial depression it has been difficult for American supply authorities to take advantage of the latest techcal developments and the higher thermal efficiencies attainable with higher steam conditions. In these circumstances, increased attention has been given to the form of plant exten-

sion which consists of new high-pressure high-temperature boilers, in conjunction with high-pressure primary turbines exhausting into existing turbines working at normal pressures of 200 or 300 lb./sq. in. The principle is not new, but the term "superposition," according to the American definition, is only applicable where extra-high-pressure plant is superposed on existing plant in order to postpone the obsolescence of the latter without introducing reheating.

Pressures of 1,200 lb./sq. in. to 1,400 lb./sq. in., and temperatures of 900 deg. F. to 950 deg. F. are adopted in America in these installations, the conditions being such that the wetness in the steam at the low-pressure end of the existing low-pressure turbines would not exceed approximately 12 per cent. The conditions for superposed plants are more favourable in America than in Great Britain because, for 60 cycles, a higher turbine speed (*i.e.*, 3,600 r.p.m.) can be used, whereas the highest speed for a non-geared set in this country is 3,000 r.p.m. The capital cost is consequently lower in the States. The use of high-capacity boilers in America is also favourable to the introduction of superposed plants, as with large boilers the capital cost per kW capacity is reduced. In some cases one boiler only is provided for one-turbine, no standby being allowed.

Modern boiler designs are characterised by considerably increased superheater surfaces arranged in a zone of higher temperature with facilities for controlling the temperature of the steam leaving the superheater. For pressures above 600 lb./sq. in. higher feed temperatures are desired, and this in turn necessitates the use of higher air preheat temperatures to maintain low chimney temperatures and high economy.

Advantages of Pulverised Fuel

Under these conditions pulverised fuel offers advantages, as it permits air preheat temperatures up to 550 deg. F. and even higher, as at Port Washington, where the temperature is 592 deg. F. As pulverised fuel firing will probably be regarded with increasing favour it is noted that (*a*) electrostatic precipitators have been developed which give a very high degree of grit extraction; (*b*) higher chimneys have, of necessity, been adopted; (*c*) boilers of still higher capacities are being called for. In America 80 per cent. of the large boilers installed recently (*i.e.*, for capacities above 300,000 lb./hr.) are provided with pulverised fuel firing.

Forced circulation may overcome many difficulties present with natural circulation boilers. Two Loeffler boilers are installed in the Brimsdown station of the North Metropolitan Co. and a La Mont boiler is being installed in the Deptford (West) station of the London Power Co. with steam pressure of 400 lb./sq. in., steam temperature 850 deg. F., and steaming capacity 350,000 lb./hr. This will be the largest boiler in existence of this type.

Natural circulation super-high-pressure boilers have been designed and are working satisfactorily. In both the high-head boiler and the Cantieny boiler the drum is placed at a high elevation relative to the convection surface in order to ensure satisfactory circulation. American practice favours natural circulation, even for the highest pressures. There is a tendency to reduce the number of boilers per turbo-generator to two, as this simplifies pipework.

The greater use of welded and forged drums will largely do away with the danger of embrittlement from substances in the boiler water. Corrosion troubles are now of diminishing consequence, as a result of de-aëration and conditioning of the feed water. Experience with the 1,300-lb. Port Washington boiler has revealed a very unusual feature. A number of water-screen tubes failed due to very rapid corrosion, although the oxygen content in the water was only 0.003 c.c./litre. The trouble seems to have been cured by reducing the alkalinity in the water and eliminating an oxygen reducing agent previously used. The trend to-day points to the use of evaporators along with suitable chemical treatment, in order to obtain almost pure distilled feed water conditioned with the minimum amount of chemicals and completely free from dissolved oxygen.

Up to the present, the method of operating soot blowers has left much to be desired, and a recent installation, where they are motor operated and remotely controlled from a central board by one press button, will be watched with interest.

Automatic Boiler Control

The C.E.B. grid system has practically eliminated very quick changes of load, enabling boilers to operate steadily for long periods, but even so it is desirable to use automatic control for at least the induced and forced draught fans. Although extensively used in America, there has been reluctance in this country to install, under usual boilerhouse conditions, the delicate apparatus necessary for automatic control.

During the last ten years, the tendency in turbine design in the U.S.A. has been dominated by the desire to obtain the maximum output from turbines running at 1,800 r.p.m. To achieve this the peripheral speed of the last row of moving blades was gradually raised to 1,200 ft./sec. The output reached with single-flow machines is 80,000 kW and with double-flow machines 160,000 kW. In Great Britain, all capacities required could be obtained at 1,500 r.p.m. with tip speeds generally lower than 1,000 ft./sec.

Blade Erosion Difficulties

As a result of the higher blade speeds used, considerable difficulties have been experienced in the U.S.A. through erosion of the blading in the low-pressure end of the turbines, and the necessity for reducing wear has forced manufacturers to provide blade shields in almost all large turbines, a practice which is also increasing in this country. At the same time as much as possible of the moisture is extracted from the low-pressure stages by interstage drainage.

The trend in the U.S.A. is to increase the size of condensing turbines running at 3,600 r.p.m.; the largest size being built is 40,000 kW for a double-flow machine. The earlier use of cross-compound sets in order to obtain large capacities has practically disappeared. For some time, mainly from space considerations, there has been a preference in the U.S.A. for single-cylinder machines for pressures up to 600 lb./sq. in. With higher pressures and temperatures, barring gear is becoming increasingly popular, particularly for 600 lb./sq. in., 850 deg. F. and above, but whereas in this country high pressure lubrication is generally adopted, in the U.S.A. it is claimed to be unnecessary, provided a heavier barring gear is supplied to take care of the initial starting torque.

In the States a number of large condensers have been constructed extending up to 113,000 sq. ft. surface in a single shell, corresponding to a surface of 0.63 sq. ft./kW capacity, whereas in this country about 0.8 sq. ft./kW is provided. American practice still continues to favour the single-flow, primarily from the standpoint of simplification of the circulating-water piping and layout. Economically, two-flow condensers would, in most cases, be justified. The use of single-flow condensers has not spread to this country. Cooling towers are not used in the States.

At present it appears to be possible to wind generators of 100,000 kW for 66,000 V, but it is doubtful whether it would be an economical proposition. The types of insulation employed have not as yet stood the test of time at the higher generating voltages. Although there is a tendency to reduce the amount of oil in switchgear to very small quantities, it seems highly improbable that oil can be dispensed with entirely, especially for e.h.v. service.

Automatic protection for the main bus-bars is being called for in many of the recent specifications, and, although there are several ways of accomplishing this, none of them appears to possess that degree of simplicity which naturally commands the confidence of supply engineers.

Precautions against air raids and the possibility of fire are having considerable effect on the design of power stations. Instead of large areas of glass windows solid roofs with the minimum number of windows well above ground level will have to be substituted. The fire risk is being met by separation of plant by masonry walls, and the use of either fixed chemical extinguishing plant or special high-pressure water spray nozzles.

Discussion

Mr. P. J. Robinson (Liverpool) opened the discussion. He regretted that so much emphasis had been placed on American practice to the exclusion of latest British achievements. He was of the opinion that capital cost in America was definitely higher than in Britain. The capital cost for the Liverpool station was £17 5s. per kW installed, which would be reduced to £16 7s. when ultimately completed, or 400,000 kW, compared with £22 per kW at the Port Washington station. Overall costs were more important than the thermal efficiency and the Clarence Dock figure was 0.202d. per kWh sent out, which was 30 per cent. below the Port Washington figure.

The need for superimposed plant had been considered in this country but it could not be made of any great use here. It was not possible to keep boilers in use for anything like so long a period as the turbines. He considered the one-boiler one-turbine arrangement a freak which would necessitate using one kind of coal of a consistent quality.

The Lamont and Loeffler boilers had objectionable features and certain portions of their design were retrograde. The radiant type of superheater had interesting possibilities, but required precautions at the time of starting. The automatic soot-blower system mentioned in the paper was being installed at Liverpool. Automatic-boiler control in base load stations was not justified. He had experimented with the entry of water into condensers, particularly with sand-bearing saline water, and considered that further research was needed to make the water entry less violent.

Mr. W. M. Selvey pointed out that the American developments outlined had been planned during five years of depression. Instead of doing nothing the Americans had planned intensively for the revival which they hoped would come. Perhaps the most outstanding feature of the Port Washington plant was the curious corrosion which had occurred, which might be due to some local condition.

Mr. F. Forrest (Birmingham) described the paper as a classical contribution but complained that the authors had omitted coal-handling plant. It was becoming more important to reduce complication in this respect and to ensure a continuous and even delivery of fuel. He believed that pulverised fuel was the correct method for large boilers and would become standard practice in time. The disposal of ash was also becoming a serious item. At Birmingham the electrostatic precipitation was done with an efficiency of over 90 per cent. The capital cost per unit output determined whether one should use a single large boiler or several small ones. For safety he was building six separate switch houses, so arranged that the loss of any one house would not seriously interfere with the output of power to the main feeding centres.

Capt. J. M. Donaldson (North Metropolitan Co.), spoke of gas washing which he considered would soon cause a serious situation if it were not dealt with promptly. He did not consider that it should be enforced outside London. Trouble experienced with the second of his high-voltage sets was due to "neutral inversion," which was avoided by taking suitable precautions when starting the machine. He would have nothing but the outdoor type of switchgear.

Mr. F. H. Clough (B.T.H. Co.) stated that the authors' figures could be accepted but only for very large turbines. The economical advantages of high-voltage generators depended upon the size of the machines. The heating and insulation of the winding of these machines had been carefully studied, especially from the point of view of surges, and they could be considered as reliable as those of lower voltage.

Mr. E. Parry (Leicester) said he was disappointed in some ways with the paper from the point of view of guidance offered to operating engineers, and there were some omissions relative to co-ordination of C.E.B. operation.

Mr. J. Clark (Simon Carves, Ltd.), declared that he was still convinced that natural circulation was the most advantageous, since the new type of boilers contained features which might affect reliability.

Mr. P. J. Chittenden (English Electric Co.) said it would have been almost better to call this paper "American Practice," since it did not deal with English or Continental developments. The Port Washington station was not the only one to adopt one-boiler one-turbine arrangement; 50 per cent. of the newer stations in America were arranged in this fashion. He did not agree that reheating of the steam was making progress in America; there were special reasons for its adoption at Port Washington. Efficiency curves were not of much use without the relevant cost. The English selection of 600 lb. boiler pressure was a happy one, since about that value there was a change in the cost figure which was very definite.

Mr. K. Baumann, in reply, emphasised that the paper was intended to give a bird's-eye view of the trend of development to enable us to compare our own conditions and learn from others what to avoid. British engineers need not fear what other countries were doing and could be proud of their own achievements. The capital cost of the Port Washington plant was for the first set, including most of the coal handling plant. That cost would be reduced 25 per cent. when the station was ultimately completed. The paper adopted a neutral attitude with regard to forced *versus* natural circulation in boilers. He did not agree that this country had lagged so far as the use of high temperature was concerned.

Reorganisation of Distribution

A report of the informal discussion which took place on Wednesday afternoon

IN inaugurating the discussion on Wednesday afternoon on the proposals for the reorganisation of electricity distribution, the President expressed the hope that criticism would be constructive. Could not the industry produce something from within? For instance, the standardisation of tariffs, in order to avoid having it interposed from outside?

Ald. Sir Percival Bower said that he was fully alive to the importance of the occasion and previous discussions on the same subject. He did not know anything before which had so stirred feelings as this subject. He was not representing any view apart from his own, and he was not speaking on behalf of large municipalities. He deprecated all talk about large and small undertakings. Such suggestions merely drove a wedge between different sections of the Association and created two camps in one body. If such a situation were allowed to develop it would hinder their efforts and spoil the result.

[*Whitlock & Sons, Ltd.*

The openers of the discussion: Ald. Sir Percival Bower (Birmingham) and Mr. W. P. Lilwall (Fleetwood)

Municipalities had blazed a trail in many respects. They had sunk twelve hundred million pounds in the industry, and, therefore, had a perfect right to criticise proposals for their reorganisation. It was not fair to say that they refused to face facts and it was not fair to hand over municipal undertakings to companies on the terms proposed, although some reform was necessary. A body representing all sections of the industry should have been asked to undertake the task, and would have commanded more respect than the body which produced the present suggestions.

He then proceeded to refresh the meeting's memory as to what the I.M.E.A. had decided should be its policy. Nothing, he said, had happened since to cause any change of view. It would be a retrograde step to change from municipal and public ownership. The word "rationalisation" tripped lightly from the tongues of certain people. He reaffirmed that small undertakings were not necessarily inefficient. Rationalisation had become an obsession. It had not benefited the consumer or improved salaries or wages in any industry in which it had been introduced in this country. The decision of the I.M.E.A. had been made known to the Minister of Transport, but he, Sir Percival, failed to follow the Minister's reasoning. In some respects it was quite incomprehensible, and that sort of reasoning completely shook one's faith in the proposals. Unless municipalities were very careful they would have a bad deal.

Mr. W. R. Lilwall (Fleetwood) then spoke from the engineer's point of view. The terms of the proposals were not purchase terms but semi-confiscation terms. There was no precedent for such large-scale amalgamation, and no one could see how future financial needs would be met. He was not able to see what would be gained. It seemed to be a case of giving the consumer 4d. and charging the ratepayer 9d. The small man was just as proud of his public service as the big man, and he had a perfect right to such pride. What was needed was control to which all must submit, large and small alike, on similar lines to the present control of sanitation. Such control could be exercised without interference with local administration.

Alderman Myott (Newcastle-under-Lyme) said that they wished to be, and remain, loyal I.M.E.A. members. It was not much use passing resolutions when the Commissioners and the Ministry of Transport had already made up their minds. The Bill would have to be fought on the floor of the House of Commons. They must not relax their efforts before it was launched, otherwise it would be very difficult to make any changes.

Alderman Healey (Beckenham) considered the best thing to do was for the Government, through the Commissioners, to pay more attention to those undertakings which had lagged behind, in the interest of consumers. Such wide-sweeping legislation as that proposed was quite uncalled for at the present time.

Alderman W. Walker (Manchester) pointed out that no one knew the contents of the proposed Bill, so each individual could imagine what he chose. But he was struck with the great change in the atmosphere of this meeting compared with that at previous discussions on the same subject. At one time there had been a danger of the Association splitting into large and small sections. That would have been fatal. Unfairness of the methods proposed for taking over undertakings

had created intense feeling. The companies must not be allowed to absorb municipal undertakings on unfavourable terms. At the same time, they must face the fact that those undertakings which were a disgrace to the industry needed some authority to compel them to fulfil their obligations. Such undertakings were a small minority, but their existence would be used as a condemnation of municipal ownership.

They must see that a fair deal was made. The antagonism towards the I.M.E.A. Council which had formerly been in evidence had been based on a misapprehension. Now that a new spirit prevailed the Council would be backed up in its efforts to look after the interests of all consumers. He did not know any large men who would be prepared to stand by and see their smaller colleagues given an unfair deal.

Councillor J. Selwyn-Jones (Newton-in-Makerfield) did not agree that there was no danger of the I.M.E.A. splitting into two camps. The smaller people had never flagged in their support of the I.M.E.A. It was necessary to ask what was wrong with the industry. Why did not the promoters of the Bill tell the industry what they wanted? Large people did not possess any monopoly of ideas or brilliancy. The smaller undertakings had a better record. If the matter were considered on the basis of figures alone, relative to percentage of consumers connected, number of cookers, water heaters, wash boilers, &c., in use, then the smaller undertakings could show that they doing their work well and properly. Let the Government first tackle the question of tariffs, particularly bulk supply tariff standardisation. The rural districts must be assisted, but the charge should be a national one.

Mr. M. S. Mason (Worksop) said they could not be blamed for conditions which prevailed up to 1926, when they were not allowed to have any proper commercial policy. It took the Central Board a number of years to make its proposals effective. Similarly, engineers required quite as long a period of years to persuade their committees to carry out a commercial policy. Proper control was necessary, whereas the Government had only provided partial control through the Commissioners. What was needed was greater security of tenure for the engineers and more power for the Commissioners to compel undertakings which lagged behind to carry out their obligations.

Mr. H. C. Lamb (Manchester) said he had not intended to take part in the discussion, but he would like to point out that Councillor Selwyn-Jones was falling into the trap of drawing too many conclusions from average records. His colleagues in large undertakings did not deprecate the smaller ones and there was no antagonism between them. Any sort of sectional action would be fatal to the I.M.E.A.'s interests. After to-day's meeting, however, they could look forward with confidence to the future.

The President then suggested that the general feeling of the meeting was that the Commissioners should be given more power to deal with undertakings which had not fulfilled their obligations. Also that there should be some sort of consultative body which all undertakings, large or small, could approach on questions of conduct, charges, &c. Having obtained the meeting's confirmation of these views, the President promised that they would be conveyed to the right quarters.

Councillor Wood (Barnoldswick) commented on the change of atmosphere of this meeting as compared with others on the same subject. There was no line of demarcation within the I.M.E.A. between large or small undertakings, and he never could appreciate why organisations outside the I.M.E.A. had ever been formed. Any signs of a clique of that sort would be misinterpreted as a sign of weakness. Without solidarity nothing of any substance could be accomplished. He did not see how the proposals would benefit any consumers, except those served by very degenerate undertakings. Very large organisations lost the personal interest and contact which were among the most valuable possessions of smaller concerns. He agreed that control was required, and that it should be similar to that exercised under the sanitary law. It was silly to interfere with progressive undertakings merely because some others were not progressive. The unprogressive ones should be dealt with first, and he believed the I.M.E.A. was the body to deal with this matter.

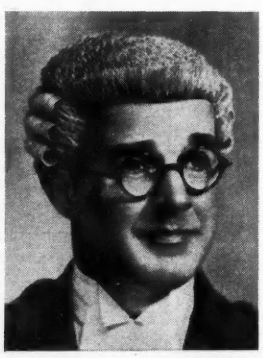
Councillor J. L. Rees (Pontardawe) indicated that South Wales authorities were entirely in favour of the policy outlined by Sir Percival Bower, but he believed also that external influences were coming into this matter which promised to affect electricity organisations.

Hire-purchase Law

How the new legislation will affect municipal electricity supply undertakings

CHANGES which are constantly taking place at the present time in view of proposed legislation have perplexed Councillor F. E. Sugden, A.C.I.S., Barrister-at-law, in an endeavour to explain how the Hire-purchase Law applies to municipal electricity supply undertakings. For this reason this short paper commences with the statement that it is impossible to be absolutely up to date on the subject. The author takes no cognisance of any events subsequent to the third reading of Miss Ellen Wilkinson's Bill in the House of Commons on May 6th. He has no doubt that the Bill will pass the House of Lords in some form or other, and that municipal electrical undertakings will not be exempt from its operations.

The paper details the provisions of the Bill and shows how it will affect the present powers possessed by such undertakings. These powers have been outlined by the present author in the *I.M.E.A. Journal*, and he believes that they will be negatived by the new Bill, which will come into force on January 1st, 1939.



[*Swaine*

Councillor F. E. Sugden, A.C.I.S., Barrister-at-law

The Bill applies to all hire-purchase and credit-sales agreements and in particular to electrical undertakings, with certain reservations regarding installations, and, *inter alia*, to goods whose value does not exceed one hundred pounds. In the agreement there must be stated the cash price of the goods as distinct from the price shown if the goods are purchased by instalments. The municipal electrical undertaking will not be entitled to enforce a hire-purchase agreement or have any right to recover from the hirer the goods unless (*a*) a note or memorandum of the agreement is made and signed by the hirer and by other parties to the agreement; and (*b*) the statement contains the hire-purchase price and the cash price of the goods and the amount of each instalment by which the hire-purchase price is to be paid and the date or the mode of determining the date upon which each instalment is payable; (*c*) the agreement contains a list of the goods to which the agreement relates sufficient to identify them.

The agreement must also contain a prominent notice showing that the hirer may put an end to the agreement by giving notice of termination in writing to any person who is entitled to collect or receive the hire rent. He must then arrange for the return of the goods and unless he has already paid at least one-half of the hire-purchase price of the goods he must pay to the owner enough to make up that one-half. If the goods have been damaged owing to the hirer having failed to take reasonable care of them, the owner may sue him for the amount of the damage, unless that amount can be agreed between the hirer and the owner. After one-third of the hire-purchase price has been paid the owner of the goods cannot take them back without the hirer's consent, unless he obtains an Order of the County Court in the district in which the hirer resides or carries on business.

In future the hire-purchase trader, that is the municipal electrical undertaking, cannot enter upon premises for the recovery of goods without committing a trespass if he has no authority to do so. There is also provision for the liability of servants or agents acting in the course of their duty. At any time before the final payment the owner or seller shall within four days after receipt of a notice in writing from the hirer or buyer and upon tender of one shilling by the latter, supply a copy of any memorandum or note of agreement together with a statement signed by the owner or seller showing, with dates, the amount paid, due but unpaid, and future instalments.

If the municipal electrical undertaking defaults in this respect it shall not be entitled to enforce the agreement or any guarantee. If the default continues for a period of one month the owner or seller will be liable on summary conviction to a fine not exceeding £10.

Whilst a hire-purchase agreement is in force the hirer shall, on receipt of a request in writing from the owner, inform the owner where the goods are at the time when the information is given or if it is sent by post at the time of posting.

In every hire-purchase agreement there must be implied warranties that the hirer shall have and enjoy quiet possession of the goods, and that the goods will be reasonably suitable for the particular purpose for which they are required.

When a hirer is liable to make payments in respect of two or more hire-purchase agreements to the same owner he shall, notwithstanding any agreement to the contrary, be entitled to appropriate the sum to whichever agreement he thinks fit. If he fails to make such appropriation then the hire-purchase trader will be in a position to appropriate the amount *pro rata* in the proportion to which those sums embodied in the hire-purchase agreement bear to one another.

There are certain rules and regulations regarding bankruptcy, but there is no alteration of the present law in this respect.

Hire-purchase is defined as giving the hirer option to buy the goods at the conclusion of the hiring or under which the property in the goods is to pass to the hirer subject to the fulfilment by him of conditions prescribed in the agreement. A credit-sale purchase is by five or more instalments. This Bill does not apply to Scotland or Northern Ireland. The only privilege which has been conceded is that where under any hire-purchase agreement the owner is required to carry out any installation and the note or memorandum of the agreement specifies the amount to be paid in respect of the installation, the reference in Section Four of the Act to one-half of the hire-purchase price which *inter alia* deals with the right of the hirer to determine the hire-purchase agreement, to Section Ten which refers to the restriction of owners' rights to recover possession of goods otherwise than by action, to Section Eleven to recover possession of the goods, and to Section Twelve which deals with the legal position when successive hire-purchase agreements exist between the parties, shall be construed as reference to the aggregate of the said amount and either one-half of the remainder of the hire-purchase price or one-third of the remainder of the hire-purchase price as the case may be. This means that where an electrical undertaking installs certain electrical fittings, *e.g.*, refrigerators, fixed electric fires, the cost of installation and the actual fire itself shall be included in the total sum of that to be purchased under the hire-purchase scheme.

Restricting Entry to Premises

Municipal electrical undertakings have at present power at all reasonable times to enter any premises to which electricity is or has been supplied by the undertakers in order to inspect meters, fittings, works, etc., and this gives power to take away any goods which belong to the municipal electrical undertaking without opposition from the consumer. This, of course, is contrary to the Hire Purchase Bill. Further, they have the power to let for hire any meter for ascertaining the value of the supply and any fittings thereto; also they have the power to remove, test, inspect and replace any goods at all reasonable times. This again is contrary to the spirit of the Hire Purchase Bill, because if the hirer pays at least one-third, the recovery of the goods must be decided by the appropriate County Court. In other words, at the present time municipal electrical undertakings have unlimited powers which will be restricted if the Hire Purchase Bill becomes law. But an amendment to the Act, moved by Miss Wilkinson, more or less confirms the present powers possessed by the municipal electrical undertakings in these respects.

Air Conditioning

In his paper, presented yesterday, Capt. J. C. Chaytor gives reasons for, and prospects of, more general adoption of conditioning methods

A VERY real and increasing demand for air conditioning is predicted by Capt. J. C. Chaytor in the paper presented yesterday afternoon. He defined the term "air conditioning" as the control of temperature, humidity, purity and ventilation of the air (*i.e.*, its circulation) within an enclosed space.

The apparatus is divided into three classes: (i) for winter use, without means of cooling and dehumidifying; (ii) for summer use, without means of heating and humidifying; and (iii) for giving all-the-year-round control of all functions. Its primary uses are (*a*) in industry to facilitate some manufacturing process or operation and (*b*) for human comfort, the latter being so much a matter of individual opinion that its definition is not attempted, beyond the explanation that a person at rest gives off approximately 400 B.th.u. per hour, the ratio of sensible heat (by radiation and convection) to latent heat (by evaporation) depending upon the weather conditions. As the dry bulb temperature rises less heat is lost by radiation and convection, and so the difference must be made up by evaporation.

Loss of moisture in the latter way accounts for between 500 and 2,000 grains per hour, for a person at rest, over the normal daily range of summer temperatures experienced in England. Provided the humidity of the air is low, no great discomfort is felt in losing more moisture at higher dry bulb temperatures, but as the humidity increases discomfort from perspiration becomes more apparent.

Under the latter conditions air movement is a palliative, and the remedy is to make the inside of the premises less hot and less humid than the outside. The adoption of this principle to combat the summer slump in America soon taught establishments which depend for profits on public patronage that the cost of air conditioning is a profitable investment. After the leaders in any one class of business had adopted it to maintain their leadership, competition for public patronage compelled, and is still compelling, others in the same trade to follow suit in order to maintain their very existence.

By the summer of 1936 the man who worked all day in an air-conditioned office, who travelled in air-conditioned trains and aeroplanes, and who lunched in air-conditioned restaurants was beginning to demand at least summer cooling and dehumidification in his own home; and so, to guide him in

The handsome central showrooms of the Torquay Corporation Electricity Department which have been seen by the I.M.E.A. delegates

the right way, in 1937 the American manufacturing and supply industries included all-the-year-round air conditioning as a standard fitting in their new demonstration homes.

So far, however, the residential market has been retarded by the high cost of equipment.

The most common outfit in the States is the central fan plant, with distribution and recirculation ducts for conveying the centrally treated air: the individual parts are factory made, but need skilled assembly on site. Then there are unit conditioners, which are delivered from the factory already assembled; this equipment may be semi- or completely self-contained.

Referring briefly to various means employed for filtering, heating, cooling, humidifying and drying the air, the author mentions an electrostatic filter recently placed on the market in small sizes for home, shop and office use. In this the dust-laden air is drawn around ionising wires charged to 12,000 V and then past a series of alternatively spaced high potential and earthed plates. The dust particles, after being negatively charged, adhere to the positive plates, which are charged to about 6,000 V and have a thin coating of oil to assist adhesion by the dust particles.

The Need for Automatic Control

To meet the refinements being called for in the operation of the equipment, greater use is having to be made of automatic controls. Pending more accurate knowledge as to what constitutes comfort, it is safer to err on the side of under-cooling than over-cooling.

In America, the electricity supply industry is, as a whole, welcoming the air-conditioning load, and through membership of local Air-conditioning Leagues, there is co-operation with manufacturers and dealers in its promotion. One certain result from increased adoption will be an increased diversity factor.

The author sent out a questionnaire in January, 1938, to 230 electricity supply authorities in Great Britain. Out of 130 replies received up to the end of February, 1938, ten authorities reported on 21 industrial installations totalling 4,746 h.p.; five reported on nine comfort installations in restaurants and cinemas totalling 1,818 h.p.; 72 reported on partial air-conditioning systems in cinemas and public buildings, the installations consisting mainly of washers and heaters with plenum ventilation. In these cases the motors for fans and pumps totalled 2,598 h.p., with an average load of 20 h.p. per installation.

At present the number of fully air-conditioned theatres and cinemas in England does not exceed seven. Several authorities mentioned the existence of air conditioning in the premises of large consumers, but details were not forthcoming. Excluding installations for national defence purposes, the author estimates that all other air-conditioning load installed in Great Britain at the end of 1937 totals 70,000 h.p. Makers of plant claim to have installed it in over 200 trades.

For winter comfort the author suggests that in England probably a temperature of 65 deg. F., a relative humidity of 45 per cent. and an air movement of 30 ft. per minute would be suitable for most people. But due allowance must be made for the temperature of the surrounding walls, since the colder they are the more will body heat radiate to them. Because of the importance of wall temperature much more attention is likely to be given in the future to panel-type heating systems.

Apart from comfort, the health aspect may have a wider appeal, since the spread of infection is minimised, and in hospitals risks from static electricity can be reduced and particular atmospheres favourable to treatment can easily be manufactured.

Controlled humidity in the home prevents furniture over-drying, excludes dampness and dust. Similar spoilage in shops can also be minimised. Furthermore, intensities of artificial illumination are tending to increase, and so great is the heat emitted from lamps and human occupancy in many of the leading stores in the States that for every added 100 kW of lighting, some 50 to 75 h.p. of refrigeration must be added to the cooling system. Efforts are being made to extract heat from the lamps direct to the outside atmosphere, but even the most practicable methods cannot prevent about 75 per cent. of the total emission becoming added to the internal heat of the building.

The Carrier self-contained "Weathermaker" cabinet is described at some length. Both air- and water-cooled models are made. They are simple to install, operate automatically and can be plugged into a 15-A outlet in a circuit at any normal voltage.

Storing "Cold"

The operating costs of large installations can sometimes be reduced by storing "cold" as well as hot. For instance, in Kansas City six theatres of about 1,000 seating capacity are cooled by means of water derived from insulated tanks containing coils through which brine or the actual refrigerant is pumped (during off-peak hours) until from 1 to 1.5 in. radial thickness of ice is formed on the coils.

Reverse cycle refrigeration may also be employed, as for the Atlantic Electric Co.'s 76,800-cu.ft. office at Salem, New Jersey, where heat is extracted from well water. The Southern California Edison Co.'s office at Los Angeles (3,778,000 cu. ft. on 13 floors) is both heated and cooled all-electrically, a heat pump extracting heat from the atmosphere by means of four methyl-chloride compressor systems each driven by a 200 h.p. motor.

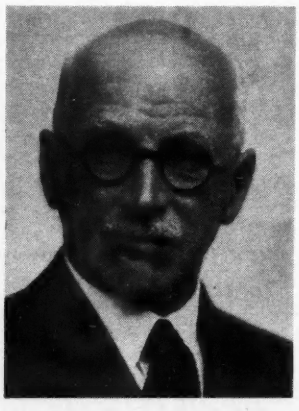
Air conditioning is having an effect on architecture. In America there is a chocolate factory without windows and two large office blocks with air-sealed glass brick walls. Such box-type construction reduces the cost of building and enables the heating and cooling to be carried out with much greater efficiency.

Compulsory Wiring Rules and Registration

Representative committee formed

IN February last the Association of Supervising Electrical Engineers announced that ten organisations had agreed to appoint representatives to a committee to investigate the question of compulsory wiring regulations and registration; to consider, and if possible, to draft a scheme; and to submit the report to the industry as a whole. It was also stated that the Government Departments concerned were willing to give advice and help if required.

This committee, which is designated the National Committee on Statutory Wiring Regulations and Registration, met in London on March 29th and again on May 16th. Its constitution is as follows:—Messrs. A. Kirk and J. Munro (Mr. A. Brammer as deputy) (Association of Supervising Electrical Engineers); Messrs. C. Rodgers and J. B. Tucker (British Electrical & Allied Manufacturers' Association); Mr. P. Good and Dr. C. C. Paterson (British Standards Institution); Mrs. Bentham and Miss C. Haslett (Electrical Association for Women); Messrs. W. Riggs and W. H. Walton (Mr. L. C. Penwill as deputy) (Electrical Contractors' Association); Messrs. H. M. Fulton, J.P., and Walter Finlay, W.S. (Electrical Contractors' Association of Scotland); Messrs. A. V. Sendell and A. C. Stewart (Mr. W. E. Fry as deputy) (Electrical Power Engineers' Association); Messrs. M. T. Greenwell and H. F. Turner (Electrical Trades Union); Mr. G. P. Dennis and another (Electrical Wholesalers' Federation); Messrs. R. W. L. Phillips and J. W. J. Townley (Incorporated Municipal Electrical Association). An application from the Conference of Joint Electricity Authorities, Joint Advisory Boards and Joint Committees for representation has been approved.



Mr. S. B. Donkin is chairman of the new Committee

At the first meeting, at which Dr. C. C. Paterson presided, Mr. S. B. Donkin, immediate Past-President of the Institution of Civil Engineers, was invited to act as independent chairman of the Committee and he has accepted the invitation.

At the meeting of the new Committee held on May 16th it was decided to notify the Minister of Transport of the intention of the Committee to submit an enabling clause with the suggestion that it should be inserted in the proposed Distribution Bill which the Government will probably introduce later in the year.

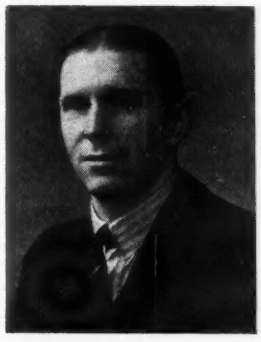
At the same time the Committee decided to consider a draft scheme of registration of electrical installation contractors and operatives.

The necessary administrative arrangements were made and communications should be addressed to the Secretary of the Committee, c/o Mr. S. B. Donkin, 8, Broadway, Westminster, S.W.1.

Electric Cookers and Cooking

By L. W. Oliver

A critical review based on experience in the manufacturing and supply fields

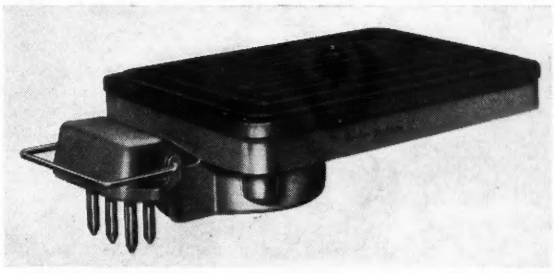


[*Wilson Gould, Torquay*
Mr. Oliver is consumers' engineer to the Torquay Electricity Undertaking

WHILST their individual objects are divergent, both supply authority and manufacturer primarily aim at still further popularising the electric cooker. But it would appear from my experience during the last eighteen years in the service of these two sections of the industry that co-operation between them has not resulted in the development of a cooker which is giving the satisfaction to both hiring authorities and users necessary to combat competition.

Criticism is unavoidable in this article and reference must be made to what might have been if a modified form of standardisation committee had taken the reins after the failure of the "Standard Cooker" venture. The manufacturers' efforts in this direction were entirely unrewarded and, apart from the activities of the E.D.A. Cooking Committee, little encouragement has since been given to them to get together with a view to developing their various efforts on parallel lines and to simplifying the interchangeability of parts.

How can such an ideal be considered when the ideas of supply men on what constitutes the ideal cooker for hiring or hire-purchase are so widely divergent? To make matters worse, it is usually found that the particular wishes of the smaller undertakings, with their smaller potential outlet for cookers, are more difficult to meet than those of undertakings with wider experience of the subject. While these conditions exist it is impossible for manufacturers to build up stocks of popular models to any useful extent and so reduce their costs which, of course, have a direct bearing on the selling price. It is not unusual for a firm to produce twenty or thirty variations of a particular model, apart from the differences resulting from voltage complications.



The Backer-Jackson "solid-radiant" boiling plate

At the present moment many supply authorities are suffering acute competition from the most popular form of cooking to-day. The prices of electric cookers compare favourably with those of a modern gas cooker, and we know that, with electricity at ½d. per kWh or under, operating costs of electric cookers are certainly no higher than gas costs, and yet we are having to fight every inch of the way, more particularly in the case of large equipment. The reason, possibly, is a comparison from the utility rather than the appearance point of view of the modern streamlined model with a popular cooker of fifteen years ago.

Has appearance, meaning finish and attractiveness, developed to the detriment of utility? Quite satisfactory, if not speedy, results were obtained with the old model. One of several true episodes goes to illustrate the point. Receiving a report that a major fault had developed on a cooker which a consumer had hired for twelve years, instructions were issued to replace the old model with a modern "de luxe" type. This consumer, however, had other ideas, and not only refused the change, but demanded that her old cooker be repaired on site. Questioned, she stated that several of her friends had so-called up-to-date models, but from her observations of the results obtained she would rather continue with her "old friend." After so many years of effort and expense in an endeavour to educate the consumer, it is surprising to still hear frequently that a person could not "get on with" her electric cooker, and has reverted to some other method of cooking.

Electric cookers have long ago passed the experimental stage, and yet it is still necessary to maintain an elaborate follow-up system by demonstrators, lest some user should be dissatisfied. In other words, even the modern electric cooker is not "user-proof." This may be understandable where boiling plates are concerned, but surely oven cooking is more a process than an art. Admittedly, the human element has to be considered, but other than intelligent users should be able to obtain satisfactory results.

Reliable thermostatic oven control on British cookers has been a long time developing, partly because many manufacturers and supply men deemed it unnecessary (some still do) and partly on account of the increased price of cookers so fitted, in spite of its exploitation by our chief competitor, due to lack of foresight for which most of us, whether buyers, or manufacturers, are equally to blame.

One British manufacturer was obtaining excellent results with an experimental thermostatically-controlled oven eight or nine years ago, but enthusiasm was somewhat damped when the verdict of a senior demonstrator of a large supply undertaking after a test was unfavourable. Thermostatic oven control has come to stay and it only remains for other undertakings to follow Bristol's policy of converting existing models to thermostatically-controlled equipments which need no demonstrating. There is possibly too much demonstration of the electric oven, especially by some manufacturers' employés. Instead, cooking lessons should be given, letting the audience take the efficacy of the cooker for granted.

A further point for criticism is the anxiety to dismantle and reassemble the cooker to emphasise the ease of cleaning. This tends to confuse the potential hirer or purchaser into thinking that the performance witnessed must be part of the electric cooking curriculum. It is not suggested that cleanliness in the electric oven should not be stressed as an essential to perfect results. On the contrary, when one is responsible for the maintenance of a few thousand cookers cleanliness tends to become an obsession. The condition of some cookers returned from hire must be seen to be believed. The fat and grease in an oven in my present district actually caught fire recently—and it was a totally enclosed box interior.

This raises another point. Most of the fat found in oven interiors could be avoided by using a double or totally enclosed roasting tin. Experience has shown that such a device, although slowing up the process slightly, has many advantages, and would doubtless minimise the numerous complaints of "smirching." But I know of no cooker which is supplied with a double roasting tin.

A word on the hackneyed question of element distribution. Possibly local conditions have some bearing on this matter, but after personally testing most makes of cookers and reviewing the experience of consumers using ovens of various types, I can say that a user who has once appreciated top and bottom heating, with double three-heat switch control, is rarely content with the results obtained with other types of heat distribution and control. It is a fact, however, that single-switch, three-heat oven control gives satisfactory results to the majority of users and with the more universal use of the thermostat the problem should settle itself.

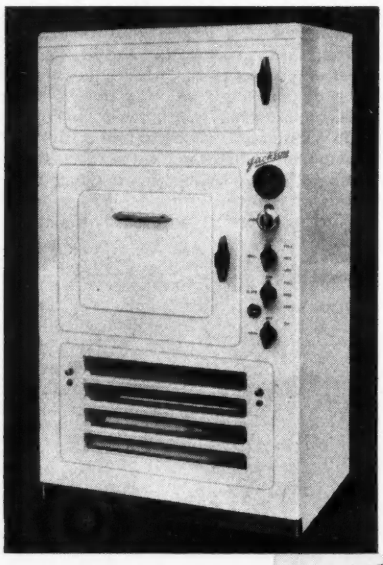
The Boiling Plate Problem

Boiling plates are still the maintenance man's nightmare. Of what use are guarantees when the stand-by man has to cover twenty, thirty or perhaps fifty miles to replace one on Sunday morning? The advance in boiling plate design as regards speed may have been satisfactory, but what of the reliability factor? I use the word "speed" and not "efficiency" because the latter has little relation to the more important factor of reliability. We have heard too much of efficiency and too little of reliability. Research and testing are, of course, essential to development, but in spite of the exhaustive tests to which apparatus may be subjected "on the bench," it is almost beyond belief what damage some consumers can cause to the finished article.

Years ago thousands of open-coil radiant-type plates were giving us speed without the use of special utensils, but were by no means dependable in service, especially in the jam-making season. Then followed the embedded-element solid plate, the transformer plate and several types of radiant plate,

all in various shapes and sizes, and now we have a modified form of the latter which is very fast. But the main factor of reliability still remains to be proved. At the moment it would appear that this latest plate, the "Backer-Jackson," is easily the greatest advance in recent years and should overcome the special-utensil bogy and also the tendency for some converts to retain one gas ring for quick boiling. If, as is hoped and anticipated, this type of plate will solve our domestic boiling problems, no doubt its increasing popularity among all sections will reduce its price to a more attractive figure in order that its adaptation to old cookers will then be feasible.

Those undertakings which have commenced cooker hire or hire-purchase schemes comparatively recently are fortunate in having only three sizes of boiling plates, apart from types, to consider, but others who have been putting out cookers for a number of years, find themselves with a real "mixed bag." Further complication would be avoided if manufacturers could give more consideration in future to the interchangeability of plates (and other parts) throughout their range of models. Progress must not be retarded, but it is an additional source of worry to the maintenance man when he finds that a new cooker has a grill-boiler or other element which,



A "streamline" cooker

although of identical construction, is so slightly altered in shape as to be non-interchangeable with the equivalent element on other cookers of the same make. Fortunate, or far-seeing, is the engineer who hires a range of cookers throughout which all the elements are interchangeable.

Grills, whether of the combined grill-boiler type or independent units, are undoubtedly the most "user-proof" part of a domestic cooker, and there is little to complain of in this direction. In the early days of electric cooking it was often argued that an element could not perform both grilling and boiling functions satisfactorily, but the combination is now taken for granted. Lower maintenance on the independent grill is still a factor in its favour, but it does not compensate for the additional initial cost of cookers so fitted. The new plate referred to appears to have potentialities as a grill-boiler, and perhaps it will serve satisfactorily without a deflector plate, which accessory is a source of inconvenience to those who conscientiously endeavour to follow the advice given as to its use.

Maintenance, then, is one of the most serious matters facing hiring authorities, especially those with cookers spread over many square miles of country. A maintenance man may be away from his headquarters for a whole day, although in touch by telephone. It is, therefore, impossible to ascertain from records the exact type of cooker on which the fault is reported in order that the appropriate spares can be taken and the following will stress the complications which may arise from non-interchangeability of elements.

Recently a 5-cwt. quick-service repair van appeared to be well loaded. So, the contents—mostly boiling plates, with some grills, grill-boilers, oven elements and a few kettles were weighed and found to be 5¼ cwt. But the driver's anticipated defence—that he had only necessities to cover emergencies—would hardly count with the magistrates in the event of an accident occurring.

The Reconditioning Staff

Many undertakings have developed small reconditioning factories. It is usual for a supply assistant to attend a manufacturer's works for a course of instruction and as the result to assist his chief either to put the existing reconditioning department on a sounder basis or to establish a new one. Would it not be better to reverse the process and let the manufacturers come to the undertaking? An intelligent fitter, with works experience and possibly an insight into general production and costing methods, should be able in a few weeks to teach, not one, but several members of an undertaking's staff quite a lot about reconditioning. Further, he would probably be able to make valuable suggestions with regard to the premises and plant required in the light of local conditions.

I suggest also that, instead of returning cookers to the manufacturer's works for renovation, as many small undertakings do, the manufacturer's trained fitter-supervisor should be hired to the undertaking at a weekly or monthly fee. He would, after examination of the apparatus to be reconditioned, requisition through the undertaking parts required, and instruct and assist the local men in carrying out the work. Suitable accommodation would be essential, but the advantages of this method to many small undertakings would be numerous.

First, a considerable saving would be effected in handling, packing and carriage charges, which can amount to fifteen or twenty shillings per cooker. Secondly, there would be no manufacturer's works overheads to be covered apart from those on spare parts and possibly the supervisor's salary. Thirdly, the manufacturers would avoid the congestion and encumbrance which a few dozen cookers from several authorities can cause in their works. The canvassing of undertakings by cooker manufacturers for reconditioning work is almost unheard of!

Rural Requirements

Some undertakings, by means of "mass" demonstrations and other intensive efforts, have flooded their mains with electric cookers, and there is little doubt that in urban areas, given a reasonable tariff, very satisfactory results may be obtained by thus educating the public, the expenditure on propaganda being justified. But in sparsely populated rural areas, with tariffs of 1d. per kWh or more, it is a different proposition. In rural areas there is no real competitor with the electric cooker in small households, but still progress is far from satisfactory. The middle classes living in country districts can afford, and invariably adopt, electric cooking, but the agricultural labouring classes simply cannot find three or four shillings a week for electricity and cooker hire. Boiling is their chief concern, as the weekly joint is rarely a large one, and at present a few sticks, a log and a little coal suffice.

An old-type cooker

One day active co-operation between the interested parties may result in a "rural" cooker of the heat-storage type, without embellishments, but with a simple oven and boiling plate. For the class of consumer in question a grill is not essential. With such a cooker obtainable at the price of the present "baby" models, it would be up to the supply engineers to do their part by offering special thermal-storage rates in line with those given for water heating in many country districts or, better still, by offering the complete service at such a small inclusive weekly figure. . . . "that men may use it at their will, as the air they breathe.

Works Visit

The new factory of Aberdare Cables, Ltd., which has recently gone into full production for the manufacture of paper insulated, lead covered and armoured cables, was visited by a party of engineers on May 17th including members of the sales staff and agents of the company, when a full tour of the works was made. They were conducted round by Mr. Elder and Mr. Plascott and other members of the works staff and the complete manufacture of paper cable was shown in detail. The new laboratory created a good impression; all raw materials are tested here immediately on receipt by the works, each individual item being bought to a definite specification.

Some Views on Load Building

By J. Lesser, A.I.H.V.E.

A plea for better organisation and a broader outlook on the business side of the supply industry

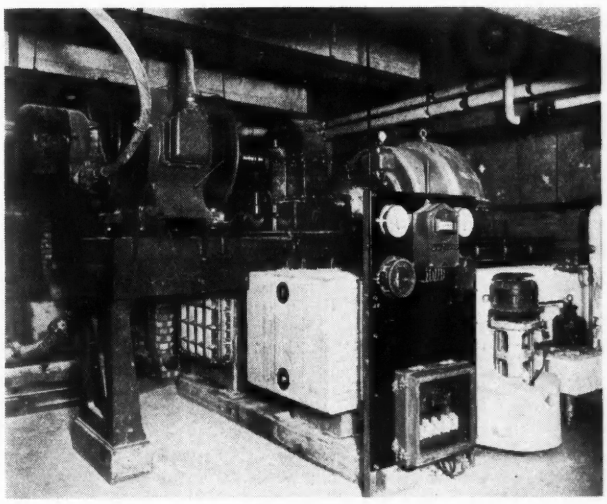
[*Elliott & Fry*

Mr. Lesser is sales manager of the City of London Electric Lighting Co., Ltd.

OF all the problems that confront electricity supply undertakings throughout the country, that concerning load building is perhaps the most intriguing. In some ways it may be said that the problem is never solved because new fields of development constantly arise, and unless an undertaking is to lapse into an unhealthy condition of complacency it must necessarily give serious attention to the new uses for which electricity becomes available in order to stimulate public demand and increase the output.

It is well-known that the distribution side of the supply industry is the responsibility of a large number of undertakings serving well-defined areas, many of which have their own peculiar characteristics. Some areas consist almost exclusively of commercial buildings, some of industrial concerns only, and some solely of residences, while others have a combination of all three types, and perhaps also a rural district. Even these divisions could be sub-divided as will be appreciated from well-recognised differences between the various types of domestic premises in existence.

Sales and sales development efforts, then, must be organised according to the nature of the area supplied, and what is possible in some areas may be entirely out of the question in others. But there is at least one use of electricity which creates a demand and a load which may be broadly described as common throughout the whole country, and that is lighting. It is doubtful whether many undertakings concentrate sufficient effort to increase the lighting load by means of educating their consumers to the benefits of improved standards of illumination. Generally the lighting load is the most remunerative because its market value is high in comparison with undertaking costs, and it will be realised after a little thought that the development of the lighting load is absolutely essential if substantial progress is to be made in the other classes of supplies.



Rotary refrigerator in the air-conditioning installation at Broadcasting House

Space heating, industrial heating, water heating, cooking, and air-conditioning alone, apart from the countless other uses for domestic purposes, are exposed to the keen competition of various media, and therefore the lowest possible rates must be offered in order to secure the load. The surplus revenue derived as a result of the high market value of the lighting load, establishes the pool from which the competition in other directions could be met without jeopardising the financial soundness of the undertakings' tariff policy.

The low terms that are now generally available throughout the country for supply for motive power, coupled with the many benefits associated with the use of electricity for this purpose, have practically abolished competition in this sphere, and in these days it would seem that the only question before supply undertakings with regard to the supply for motive power, is whether the consumer's manufacturing costs have been reduced to the lowest point so far as electricity supply is concerned. In large installations where the consumer finds it necessary to install a fair amount of stand-by plant a tariff based upon maximum kVA demand, in preference to the connected demand, will generally be found the best method of ensuring satisfaction to both the undertaking and the consumer.

It is in the realm of heating, no matter for what purpose, that the fight is keenest. Very many undertakings measure the success of their development work by the number of cookers put out on hire. Quite apart from the serious question of whether cookers should be put out on hire-purchase over a lengthy period in preference to simple hire (a point which is exercising the minds of many supply engineers to-day owing to the heavy maintenance costs after a few years' use), insufficient attention appears to have been given to the fact that the annual consumption per kilowatt installed for water heaters is considerably greater than that for cookers, and water heating is therefore a much more remunerative load. For example, the average annual consumption of a 5-kW cooker may be put down at 1,500 kWh, whereas the comparable figure for a 12-gallon water heater loaded at 1,200 W is 2,000 kWh. More often than not the water heater is thermostatically controlled, so that a good diversity factor exists in respect of this class of load.

Other questions which must be resolved with due regard to the character of the area concerned are those of free and assisted wiring, and hire and hire-purchase schemes. The principle underlying all these arrangements is the removal of obstacles along the path of load development by reason of the unwillingness or inability of potential consumers to meet, at the outset, the capital cost of wiring and apparatus.

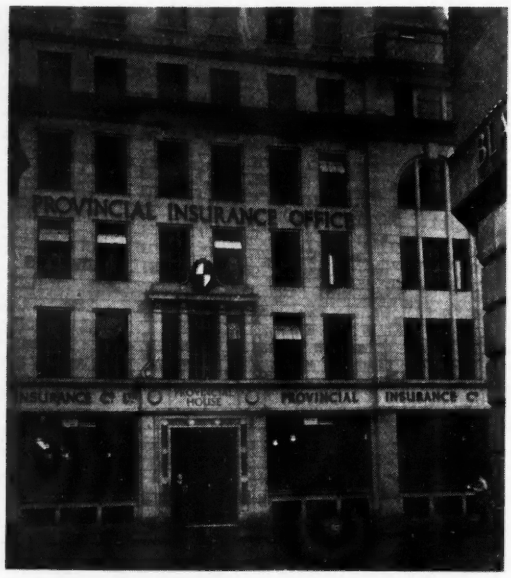
Too much stress cannot be laid upon the fact that electricity supply undertakings have something to sell and should, as far as practicable, endeavour to organise their businesses in much the same way as any other efficient trading concern which is anxious to increase its turnover. So far as wiring and apparatus are concerned it is all a question of what is a reasonably sound business proposition. Hire-purchase in itself has long become a leading feature of modern industrial activity, and has been responsible for building up a considerable volume of business that would otherwise have been impossible to obtain. The details of the respective schemes employed by supply undertakings should be worked out in accordance with what is known of the consumers' "ability to bear."

A scheme which seeks to impose a larger sum for hire-purchase payments upon working-class consumers than they can manage is bound sooner or later to meet with difficulties. Indeed, the realisation of this fact has been largely responsible for the remarkable success achieved by firms engaged in the hire-purchase of house furniture. On the other hand, in those districts where the income of the potential consumers is upon a higher level than that obtaining in the poorer districts, the assisted wiring and hire-purchase terms can and should be restricted to a shorter period.

One usually associates such schemes with domestic premises only, but it is suggested that undertakings should not close their eyes to the benefits that may accrue from arrangements in special cases when dealing with commercial consumers who are invited to adopt electricity for space heating, air-conditioning and other services representing substantial loads. A contribution in such cases towards the cost of the necessary rising mains may just turn the scale in favour of electricity and be well worth the price.

Perhaps the most dangerous ground on which one can tread in a broad consideration of the subject of load building is that concerning the undertakings' tariff policy. It must be assumed that the main endeavour of all undertakings is to reduce their tariffs for different classes of supply to the lowest point consistent with sound management, and that every undertaking believes that for the time being its tariff is as low as possible. In the absence of the knowledge and experience acquired by

the managements of the different undertakings with regard to the peculiarities of their respective areas it is easy enough to criticise and offer gratuitous advice, but it will generally be agreed that the rate of progress in load building will depend very largely upon the character of the undertakings' tariff policy. Parliament, in its wisdom, has provided that undertakers shall not show any undue preference in making agreements for a supply of electricity, and this statutory obligation makes it necessary to establish a standard tariff for supplies among the general body of consumers. As everybody knows, there is a multiplicity of tariffs in operation in the different areas throughout the country which in many respects display an ingenuity and resourcefulness designed to attract all kinds of loads.



The installation of 415-kW of "Soapstone" radiators is the result of the load-builder's activities in these premises *[Elec. Rev. photo.*

In the desire of influential people in the industry to attain a measure of uniformity of tariffs, not only has little credit been given for the substantial development that has already taken place in the presence of the existing variety of tariffs, but it is suggested that insufficient regard is paid to the ever present differences which exist, not only in the areas of supply, but also among the consumers generally. It is admitted that, notwithstanding the existence of standard tariffs, there is nothing to prevent undertakings from entering into special agreements with large consumers, but it does seem necessary for the standard tariffs of the undertaking to be framed in a form which is most suitable to the area concerned. An amalgamation of one or more distribution areas under a single management will inevitably delay a reduction in the rates charged to a number of consumers within the enlarged area, until the tariff in a portion of the enlarged area has been brought down to the level of that hitherto existing in another portion of that area.

The following simple example will illustrate what is meant. Take an area A with a flat rate of 6d. per kWh, another B with 5d. per kWh, and another C with 4d. per kWh. It is unlikely that the whole will immediately be brought down to 4d. per kWh. I suggest that what will happen is that the 6d. area will gradually be brought down to 5d., and then the 5d. area will be brought down to 4d. But during the process of reducing the 6d. and 5d. districts down to 4d., the consumers in district C will have to wait before they get reductions that they might have secured earlier.

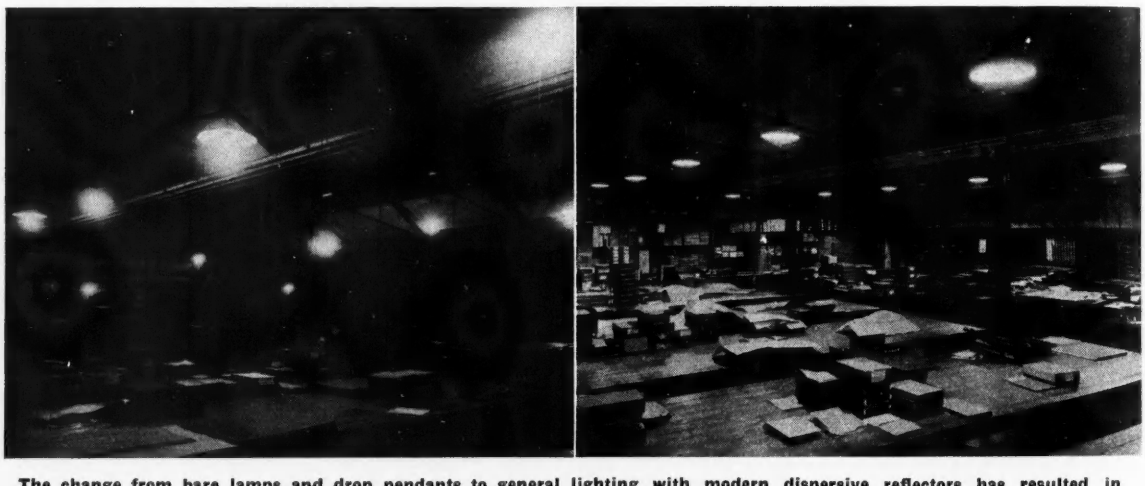
This is not to say that in the long run there may not be certain advantages resulting from an amalgamation of supply areas or a working arrangement between them. One can visualise certain economies in management and a more rapid step forward in the process of establishing the standard three-phase four-wire distribution, but any legislation introduced by Parliament with a view to a reorganisation of the distribution of supply should be accompanied by a frank explanation of certain temporary disadvantages in order to avoid a large number of consumers being disappointed because benefits do not accrue immediately. Soon after the 1926 Act was passed it was not an uncommon thing for consumers in business premises to inquire how long it would be before electricity would be reduced to one-halfpenny per kWh net, "as was promised when the Government introduced the Bill."

There are undertakings which refuse to depart one iota from their published standard tariffs, for the reason, so it is understood, that the tariffs have been framed to be suitable for loads of all kinds. Such a sublime state of affairs is certainly to be envied and is an example of the resourcefulness and ingenuity with regard to tariffs previously mentioned. It is difficult to believe, however, that in such cases there have not been many large consumers who have resented the "take it or leave it" attitude which must in the end have been exhibited by the undertakings' representatives when faced with an application, urgently and skilfully argued, for special terms to meet a particular supply.

It is suggested that although undertakings should certainly not lightly depart from their published standard tariffs, there is much to be said for the policy of an open mind when, as happens in other trading concerns, a customer walks in with a very attractive inquiry and offers the undertaking a substantial load conditional upon his receiving in return terms which make it an economic proposition for both sides.

Electricity is a commodity so unique and attractive that there has been, and still is, an insistent public demand for it. A great many of the supply undertakings in the country owe their prosperity as much to this demand as to anything else. As so often happens when a new industry vigorously challenges the established position of others, a rare fight ensues between the old and the new. The strongholds of lighting and motive power may fairly be said to have been captured, but the defenders of the old methods are struggling heroically to hold their ground in the heating field and are making us fight every inch of the way. This is not a time for complacency. The selling side of an electricity supply undertaking should be carefully planned and organised and also energetically directed. It should be supported by skilful propaganda and advertising.

Some fine work is being done by both E.D.A. and E.L.M.A. in providing the means by which young men coming into the sales side of the industry can receive the necessary education and training. The labourer is worthy of his hire, and undertakings should be prepared to pay as much as, and perhaps more than our competitors do, in order to secure the right men for this very important branch of their business.



The change from bare lamps and drop pendants to general lighting with modern dispersive reflectors has resulted in much improved lighting in this industrial packing shop

A National Marketing Policy

By Brig.-Gen. R. F. Legge, C.B.E., D.S.O.

Does expert sales control mean prosperity?

The author doubts whether the mere amalgamation of supply undertakings will lead to cheaper electricity. He advocates an Electrical Sales Development Board to work in conjunction with the principal electrical associations to organise the marketing of electricity

"THREATENED lives last long" is an old saying, and the life of the existing distribution organisation of the electrical industry is proving no exception. There is little doubt, however, that barring outbreak of war or unforeseen catastrophe, new legislation sooner or later will cause small distribution undertakings to disappear—the larger species will devour the smaller—a meal that may prove more expensive to the consumer than is anticipated. One of the most important points at which this reorganisation aims is a lowering of existing tariffs so that the general public may pay still less for the electricity it uses—or (may we hope?) get more electricity for its present expenditure!

Many clear-thinking people realise that the distribution side of the industry needs to have its house put in order and that much existing legislation should be clarified and co-ordinated. Some fail to see how amalgamation into large districts and undertakings with the inevitable heavy expenditure, which must include considerable payments for goodwill, can produce the result required. In fact, opponents of the proposed Bill aver that tariffs will rise as a consequence.

One dislikes to don the mantle of a prophet but should new legislation result in increased prices, as seems likely if rural areas are to be developed immediately, there will be an outcry from the public, whose appetite for cheaper electricity has been whetted by the long delay in bringing about the promised changes, despite the steady flow of reductions that are taking place all over the country without any compulsory legislation whatever.

What is the main essential to give a scheme of reorganisation any possible chance of success? The answer is simple. Such action as will *accelerate* both the normal increase in the connection of consumers (which includes development of virgin areas) and the normal increase in the general use of electricity for all purposes. The only way such normal increases can be accelerated is by an efficient marketing policy, *i.e.*, more skilful salesmanship, a common selling policy in all undertakings, more uniform publicity and a high degree of co-operation amongst all sections of the industry. The success of any new legislation will depend upon whether it can satisfy these vital requirements. Experience in other successful industries indicates the necessity for sales control and national co-operation. In considering such a scheme one has to think not only of distribution, but of generation, manufacturing, research and the contractor.

General Legge, this year's chairman of the E.D.A. Council, is director and general manager of the British Power & Light Corporation, Ltd.

We now come to a subject which may not be so acceptable, although it has long been advanced by prominent business heads outside our ranks. It is customary to devolve upon the borough electrical engineer or engineer and manager of supply undertakings, in many cases against his own inclination, the manifold duties of engineering control, commercial management and sales organisation. Here, I venture to assert, lies a fundamental error, which has grown up with the industry and has been responsible for the fact that the selling side has not kept pace with the vast potential development in the use of electricity.

While there is no doubt that the British electrical engineer stands pre-eminent, he himself will be the first to admit the possibility that his technical training hinders rather than assists him in the commercial work of the high order now necessary to equal that exhibited in competitive industries. Engineering is an exact science while sales management is an art calling for a creative imagination; the one deals with physical factors, while the other is concerned with psychological reactions, two quite dissimilar characteristics rarely found highly developed in the same individual. Some undertakings have recognised this fact and are recruiting even their junior sales personnel from outside the industry. This, however, is dealing with the situation from the wrong end; our present junior salesmen, given a sound lead, are of the right material. What appears to be lacking is pre-eminent leadership.

To obtain this leadership the electrical industry should have its own central sales organisation armed by legislation with executive authority, but free from bureaucratic control. This might be termed the "Electrical Sales Development Board." A real national marketing effort is essential and the formation of such a Board would give a national character to the effort and assist to bring about what is so much needed.

E.D.A. operates on a national basis so far as publicity is concerned. It is sponsored by one section of the industry only, *i.e.*, the supply section—and financially assisted by the Central Electricity Board, both on a voluntary basis. Voluntary efforts are bound to be spasmodic and uncertain from the very fact that they are dependent on the goodwill of their supporters, and it would be a wise prophet who could state with any degree of certainty what the future of this Association will be after the reorganisation, which the new Bill proposes, comes into effect, and a restricted number of new districts, each composed of large undertakings which have absorbed their smaller adjacent brethren, replaces the existing arrangement.

E.D.A., with its efficient staff of experts, would work under the guidance and form an integral portion of the new Board, being responsible for the national publicity; the remaining section would devote itself to effecting a national marketing policy for the industry. The Director of the new Board should be responsible for forming a close liaison with the C.E.B., the British Electrical and Allied Manufacturers' Association, the Electrical Contractors' Association, the Electrical Research Association, and the Electricity Commissioners. In order that he may not be hampered in dealing with the difficult problems that will arise, the Board should have the same semi-official character and flexibility as the Central Electricity Board now possesses.

It would also be the Director's responsibility to promote a national selling policy for all distribution undertakings and invite the manufacturers' co-operation. At present co-operation, except such as exists between the C.E.B. and E.D.A., is negligible. Manufacturers are spending hundreds of thousands of pounds annually in competing one with the other in selling to the supply industry. It should not be difficult to divert part of this effort and money to co-operative effort with supply undertakings in selling to the public to the benefit of all concerned. The success of the Refrigeration Committee of E.D.A. in its campaign of co-operation goes part of the way towards this idea and provides a happy augury for this suggestion.

The means to carry out such a project should be made available without the Director or staff having to give a considerable portion of their energy to procuring finance. The income necessary to enable the new Board to work efficiently should be well over a quarter of a million pounds a year. This could be obtained by means of a levy on the whole industry somewhat similar to that of the Electricity Commission.

Under such a system, a levy of, say, 0.275 per cent. of the gross revenue of each undertaking (excluding bulk supplies) would have realised about £200,000 this year. This, with the E.D.A. contribution now obtained from the C.E.B., which might be willing to divert this to the new Board, would realise £250,000, a sum which, being calculated on a percentage of revenue, would automatically increase year by year. In addition to this, supplementary sums might be obtained from manufacturers to support special campaigns as is now being done through E.D.A.

This scheme would relieve E.D.A. of its dependence upon voluntary membership and voluntary subscriptions from the supply industry alone. The C.E.B. could co-operate as above mentioned so that liaison with the generation side of the industry would be maintained. The manufacturers' and other associations mentioned above would be asked in their own interest to form executive committees to work with the new Board. Those supply undertakings that now pay subscriptions to E.D.A. would pay these no longer; the difference between these subscriptions and the proposed levy would not be alarming and would be well justified by the resulting service and publicity that would accrue.

If we must be reorganised let us see that in the resulting upheaval salesmanship is given its proper and vital prominence in the scheme of things. The success of the new Electricity Bill will be determined by the quality of salesmanship it produces in the industry. If it succeeds in this respect a valuable national service will have been rendered to the industry and to the consumer.

Personnel Problems. By Staff Manager

Securing a broader outlook

IT is an unfortunate fact that employés in electricity undertakings tend to become divided into the three watertight departments of engineering staff, manual workers of all grades, and the clerical staff. The placing of various employés into these different departments has the result of making the separate departments not only watertight but "idea-tight." A man entering the industry in one of these separate departments has a definite path marked out for him, and the path through which he has to proceed is so well marked out that it has become a groove.

In the past few years the progress of technical development has been such that business has come easily to many undertakings, because they have been able progressively to reduce their charges to the public, and thus bring in an ever-widening circle of fresh consumers to the mains. The recent increase in the costs of coal, materials and labour have made many undertakings announce that they cannot further reduce their charges, and, in fact, a number of them are in the position of just being able to carry on without any increase in their tariffs, as yet.

If the avenue of lower costs, lower charges, is being closed, undertakings will have to find other means of progress if the pace of development is not to be arrested. In such times the human element becomes all important. The efficiency of the staff to the undertaking depends not only on their original selection, *i.e.*, in getting the square pegs into the square holes, and on the conditions of service under which they will be employed, but also in the experience which they will be able to obtain.

The author complains that the clerical and sales staffs of electricity supply undertakings are too rigidly "graded" and grow into better "officials" than advocates of electricity. He suggests that there should be an easier interchange of staff between authorities to broaden experience

Work in a groove is liable to turn an enthusiastic recruit into a local government edition of an unimaginative and unprogressive type of civil servant. This can be counteracted in both of two ways: by a change of work in the undertaking, and by a change of undertakings in which the employé works. So far as the higher engineering staff is concerned this works out quite well in practice. As vacancies occur they are advertised in the electrical Press, and a man from one undertaking moves to another, so that there is a general circulation of men and ideas from one place to another.

Interchange of Ideas

Although different undertakings on the whole may be equally progressive, the same degree of initiative may not be shown in all the departments. One undertaking is successful at acquiring a good cooker load; another in developing power supplies. The change round of personnel helps in spreading different ideas which have been proved valuable in the commercial development of the industry.

There is little need for the manual worker to change jobs from one undertaking to another; except for differences in the rates of payment in different regions there is little incentive for him to do so. Often, too, an increase in wages so obtained would be swallowed up in the increased cost of living in the higher paid area. Neither does the type of work required justify the change of employment.

It is the third class, that of the clerical and similar posts, where a change is both essential and desirable. It is necessary for the efficiency of the undertakings and of the employés themselves. Criticism of the existing staffing arrangements falls under a number of headings, all of which are opposed to the general efficiency of the commercial side.

It is a great pity that the clerical staff is not recruited into the industry as such. An electrical engineer is an electrical engineer first and an employé of his particular company or municipality second. He goes through his training to qualify himself as an engineer and it is probably in the lap of the gods whether he joins the manufacturing branch of the industry or becomes employed in the generation and distribution of electricity. If his experience covers both so much the better.

The clerical man in the industry, employed by a municipality, does not enter the electrical industry except by accident. He passes a qualifying examination for municipal clerks, and is posted to whichever of the corporation departments happens to have vacancies. Although as a boy, his heart may have been set on becoming a great electrical administrator, instead of an engine-driver, he may quite conceivably end up by becoming a clerk in the offices of the Public Assistance Committee and not be able to do anything about it.

This method of recruitment makes him a local government official first and a salesman for the industry in which he is employed a very poor second. This is not to be taken as in any way a reflection on government servants, central or local, but it is universally recognised that the qualities which make the British Civil Service the envy of the world, are qualities of integrity and fairness, and not of business enterprise and acumen. In the future the latter qualities will be more and more in demand.

In the local government service, when vacancies arise in one department, it is customary for the notice of the vacancy to be circulated to all other departments under the same authority. So that when a vacancy arises in the electricity department, it is filled either by someone of the same department, if he is of the right "grade," or by someone from another and totally different department just because he is senior in the corporation service, and not because of any knowledge of, or interest in, the electrical industry. Very often that is the case. In a growing industry there are constantly being created fresh posts which are often filled from other sources. Thus the administrative, as opposed to the business, bias of the undertaking, is still further increased.

The gradual control of the financial and the clerical staff by the borough treasurer still further cuts down the interest of the clerical staff in the electrical industry as such. Promotion on the accounting staff will come to people of long service in other accounting divisions of the corporation, instead of through the electricity department of the town concerned and the electrical industry of the country. The result is that there is a lack of scope for promotion and a cramping of initiative.

The salaries paid in general municipal service are low, and are not sufficient to attract the best recruits. The security of tenure attracts people for ordinary administrative posts, but that is not sufficient for trading departments. The highest salaries paid after years of service compare very unfavourably with those of junior engineers fresh from college.

Lack of Mobility

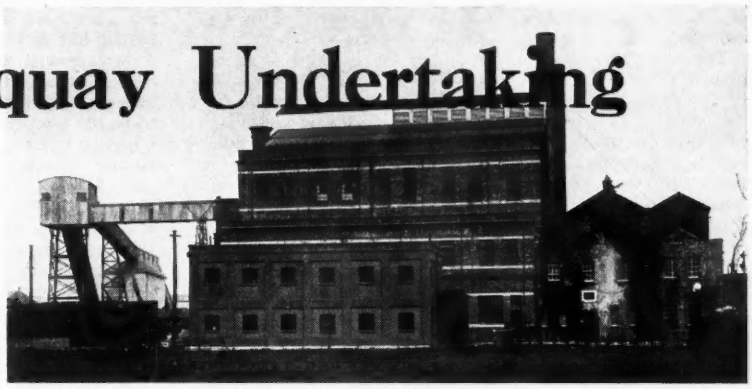
There is little interchange of staff between the different undertakings as compared with the engineering staff. Very rarely does one see advertisements in the electrical Press for any non-electrical staff, except for showroom posts, and even here the higher positions are really engineering vacancies, demanding that the man have engineering and not selling qualifications. Yet no section of the staff deals with the public more than the clerical and the showroom staff. A further restriction is that the few advertisements by corporations usually specify that the applicant shall have had municipal experience, and the company advertisements are equally restrictive.

The industry would benefit if employés of all grades had greater opportunities of gaining experience in different types of work, and especially with other undertakings. Purely trading departments should be run on purely trading lines so far as the personnel arrangements are concerned. Much less insistence should be placed on the "grades" of employment, and much more on the work required to be done. It should be recognised that such tasks as advertising and statistics, for example, are fields calling for the energies of properly qualified advertising managers and statisticians. An advertising man of experience does not have to have spent so many years in the electrical industry. His job is designing advertisements which will attract the public to buy the wares provided, whether it be face cream or electricity. Too often these posts are considered to be the spare time occupations of engineers whose talents lie in other directions.

The Batti-Wallahs

The last monthly luncheon of the season of the Batti-Wallah's Society was held at the Hotel Victoria on May 18th. At the request of the president, Mr. R. H. Gummer, members and guests stood in silence for a few moments as a mark of respect to the memory of the late Mr. W. E. Highfield a past-president of the society. A message was received from Col. R. E. Crompton regretting his absence on account of his having to attend a board meeting. At the suggestion of the president a toast was drunk to Col. Crompton, who will be ninety-three years of age on May 31st. Among the guests present were Mr. H. E. Colwell chief electrical engineer of the Victorian Railways; Mr. Gulje an eminent Dutch engineer and economic adviser to the Netherlands; and Mr. Mordey Lang, from South Africa. The principal guest was Mr. J. Ellis Barker, who described the methods by which he practises homœopathy and the manner in which the drugs he employs are prepared, all very different from orthodox medical practice. Commander F. J. Campbell Allen proposed the vote of thanks.

The Torquay Undertaking



The Newton Abbot station: part of the original works is seen on the right

DURING the brief "off-duty" times at electrical conventions the local undertaking is always sure of a number of visitors. Torquay will not fail members in this respect and the following notes on our own observations, made by the courtesy of Mr. G. J. Hollyer, M.I.E.E., borough electrical engineer and manager, are designed to assist delegates in their quest for special features.

The Newton Abbot power station is operated by the Central Electricity Board as a peak-load station, and this largely influences the operating results. It was a somewhat uncanny experience to visit a sizeable station during a complete shut-down about which nobody was perturbed.

The fuel for the station—coal and coke breeze— is delivered by rail, and on the sidings a truck tippler receives the wagons and deposits their contents into a hopper which forms part of an extensive handling system in which drag-link and bucket conveyors transfer the fuel either to a storage silo or to bunkers above the boilers. The bunkers are divided into sections for coal and coke, respectively, which are led by chutes to the boiler hoppers. These are so sub-divided as to allow the fuel to be fed on the "sandwich" system. The economical working results of this system of firing have been particularly marked during the past few months, during which the price of coal has risen by 50 per cent.

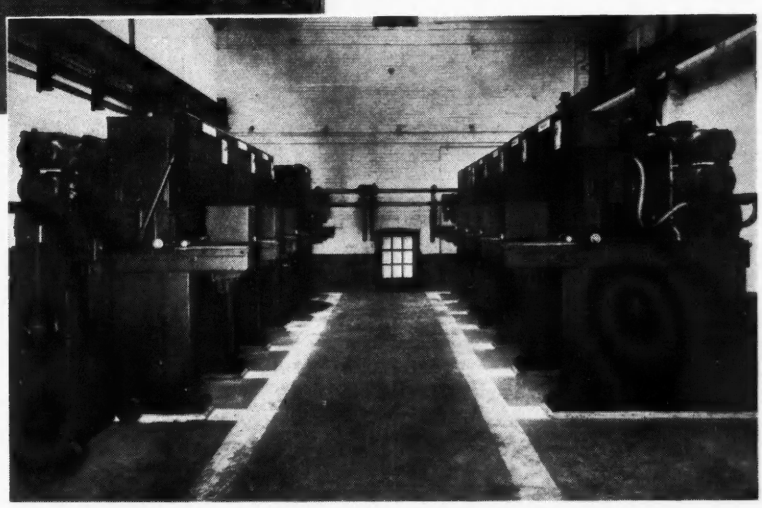
There are eight boilers, all of the Stirling water-tube type with chain-grate stokers. Four of them each have a capacity of 25,000 lb. per hour and generate at 165 lb. per sq. in., while the two 33,000-lb. per hour and the two 50,000-lb. per hour plants all generate at 265 lb. per sq. in. The low-pressure steam was rendered necessary when the station was established by the transfer of some turbo-alternators with l.p. steam conditions from the former station at Beacon Quay in Torquay. The six smaller boilers operate with induced-draught only, but the largest units have both forced and induced draught and are automatically controlled. The adoption of automatic control for the two 50,000-lb. boilers has resulted in considerable improvement of the efficiency of the whole boiler house, which is now operated without additional staff beyond that which was employed for the six smaller boilers only.

The Hagan compressed-air system of automatic control is employed, the air actuating the fan, stoker and back-damper motors. An air compressor feeds, *via* a container, a master sender which serves the operating points and is also connected to the boiler steam outlet. Rise or fall of steam pressure thus results in air impulses being sent to the operating points, where pressure-actuated relays raise or lower the speed of the driving motors. The compressor is automatically controlled by the air pressure in the container. The automatic operation tends also to regulate the operation of the hand-controlled boilers. The make-up water from the town mains is soft enough to render water-treatment plant unnecessary. There is an efficient de-aerating plant.

There are two 7,500-kW turbo-alternators operating on the h.p. steam and two 3,750-kW sets working on steam at 165 lb. per sq. in., all of B.T.H. manufacture. A suitable connection between the h.p. and l.p. steam mains enables the l.p. sets to be operated from the h.p. steam through a reducing valve. All the auxiliary motors throughout the station are normally supplied, *via* a d.c. switchboard, by three rotary convertors, but provision has been made against a complete failure of supply from the a.c. busbars by the installation of a 225-kW triple-expansion engine d.c. generator set.

The surface condensers and the generating sets receive their circulating water from two pump houses on the bank of the River Teign. In one of these there are two pumps with a total capacity of one million gallons per hour, while in the other house three smaller pumps have a combined capacity of half a million gallons per hour. Each pump house has its own main common to its particular motors, the larger house serving the newer generating sets and the smaller house feeding the older part of the station.

Connection to the grid in 1935 necessitated additional 11-kV switchgear having a rupturing capacity of 500,000 kVA, and this metalclad equipment is interconnected with the original cellular switchgear through suitable reactors. Both sections of the switchgear are arranged for remote electrical operation from the station control room by panels which form part of an extensive switching platform



Above: Boiler house showing the automatic control equipment. Right: The new 11-kV switchgear

on which the Central Board's 132-kV operating panels are also mounted.

The major part of the undertaking's 488 sq. miles of supply area is rural in character and is served by an 11-kV system of overhead lines which is rapidly becoming fully loaded. The system has served for both main transmission and distribution to the whole area, including bulk supplies to five other supply authorities. Briefly the 11-kV system consists of a major ring main from Newton Abbot in the north and the area to Modbury in the west to Kingsbridge in the south to Dartmouth in the east back to Newton Abbot. Various spurs radiate from the system to afford supplies to communities and large consumers.

It has always been visualised that eventually this 11-kV system would require augmentation, and effect is now being given to the project by the construction of a 33-kV transmission line right across the system to connect at Newton Abbot, Totnes, Paignton and Kingsbridge. This new main transmission system is expected to be completed by the end of September. It is being constructed with overhead lines supported on steel towers. Transforming sub-stations to be established at the points of connection will be of the outdoor type and will vary in capacity from 30,000 kVA to 4,000 kVA. Callender's Cable and Construction Co., Ltd., is supplying the overhead lines, Pirelli-General Cable Works, Ltd., the cables which will link the system through the urban areas on the route, and the British Thomson-Houston Co., Ltd., the transformers and switchgear. The new system will be fed directly from a 33-kV switching station adjoining the grid sub-station at Newton Abbot, but step-up transformers at the power station will be connected with the switching station by 33-kV oil-filled cables.

The sub-station at Moretonhampstead

At Chipley in the Newton Abbot area we saw one of the dozen or so switching stations on the 11-kV ring and the general arrangement is typical. Two panels provide for "in" from Bradley Lane, and "out" to Ashburton on the ring loop, while a third serves a spur to the Dartmoor area. On this spur a compensated reactor provides protection so as to isolate any fault from the main system. Normally there is no flux in the core, but under fault conditions the flux develops an e.m.f. in the relay *via* a tertiary winding. The idea was born in Torquay and Mr. Hollyer is believed to have been the first supply engineer to install it on a system. The equipment was manufactured by the Hackbridge Electric Construction Co., Ltd. For the main lines reliance is placed on definite time delay for protection in addition to ordinary overload and earth-leakage protection.

Distribution in the Borough

Low-voltage distribution in the Torquay borough is single-phase, the system being served by a 2,000-V, two-phase system which, in turn, is derived from the main 11-kV transmission by Scott-connected transformers. At the moment there are four main 11-kV sub-stations, and the one at Torwood may be cited particularly because its situation next to the Grey Cars garage, where the I.M.E.A. exhibition is being held, makes it easily accessible to delegates. It has plentiful ground-floor space with the transformers in the centre and its 11-kV, 2-kV and l.p. switchgear on an overhead gallery. When the 33-kV system is put into commission there will be a fifth 11-kV sub-station for Torquay proper at Lawes Bridge near the north boundary of the borough. This will be the main distribution centre for the borough and at present the 33-kV cables from Newton Abbot are serving a temporary 11-kV sub-station on the site.

As an adaptation to the old d.c. three-wire networks the low-voltage system at Newton Abbot is two-phase and is served by a 2,000-V, three-phase system supplied from 11-kV to 2-kV sub-stations at the power station and at Bradley Lane. Many delegates will remember the latter sub-station which was on show at the time of the last Convention at Torquay on account of the initial installation of Whitehead self-isolating switchgear.

Throughout the supply area the load is mainly domestic, but there are some notable industrial and commercial consumers including some hotels in the borough which consume up to 250,000 kWh a year for cooking and heating. Some outstanding consumers are the Stoneycombe lime quarries, where a 90-kW bitumen boiler has been installed; a cider factory at Abbotskerswell where apple crushing and pumping demand 300 kW; Seale Hayne Agricultural College where preliminary experiments in such electrical work as soil heating are likely to be the forerunners of larger developments; Buckfast Abbey where a 60-kW public supply now supplements the hydro-electric system installed by Brother Ignatius; Torbay Hospital, 354,000 kWh; and Dartington Hall Estate where a consumption of 559,000 kWh per year contributes to educational work in the preservation of rural industries. A consumption of two million kWh per year is expected from the new B.B.C. transmitting station at Start Point.

The undertaking's testing station at Newton Abbot, in addition to coal, water and oil testing, is equipped to deal with 8,000 meters annually, but the fast-growing demands have led to the decision to erect another station at a cost of £15,000, which will deal with up to 70,000 meters a year.

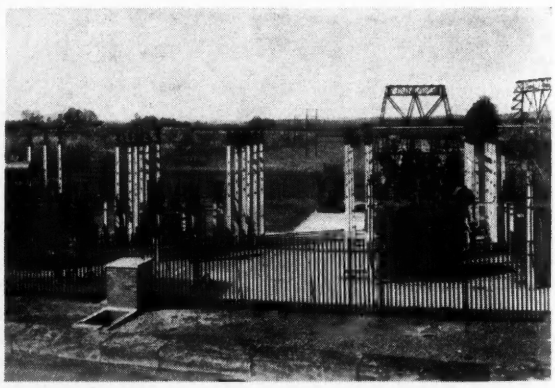
In 1924 the Torquay showroom consisted of a small lock-up shop in Union Street and in 1931 a further showroom and demonstration kitchen was opened in Newton Abbot. The main Torquay showrooms of to-day are a veritable hive of industry, with their 365,000 cu. ft. in five storeys, and will catch the eye of many a delegate at the time of the functions at the adjacent Town Hall. The opening this year of showrooms at Totnes where the population is less than 5,000 is an outstanding example of enterprise. An attractive reception room with a cash counter opens on to the street, at the back there is a well-appointed demonstration room which will seat 50 persons, and upstairs there is an excellent fittings room.

We are indebted to Mr. Hollyer and to various members of his staff for help in collecting the above information.

The Cheltenham Supply

OWING, no doubt, to the difficulty of accommodating the large number of people who attend the I.M.E.A. Convention Torquay was selected for this year's gathering instead of the President's home town—Cheltenham.

Mr. Bache has been electrical engineer in that borough for about twenty-three years having previously been electrical engineer of the nearby city of Gloucester. In the past few years the undertaking has shown steady growth and it now has an annual output of between 13 and 14 million kWh and has connected load of about 45,000 kW.



The Hester's Way sub-station, Cheltenham

The supply area, which includes a number of rural districts, is about 36,000 acres in extent, the population being 64,000.

In 1932 the generating station was closed down in favour of a complete bulk supply from the Shropshire, Worcestershire & Staffordshire Electric Power Co. Our illustration shows the company's Hester's Way sub-station at which the incoming 66-kV supply is stepped down to 11-kV and passed on to the Corporation's sub-station at Rowanfield Road. From this a ring main around the borough is fed.

Water Power in West Devon

This system of three small hydro-electric stations, which possesses many picturesque and interesting features, produces eight million kWh a year

A LITTLE farther west than the Torquay area there is in the hydro-electric schemes of the West Devon Electric Supply Co., Ltd., much of interest for those delegates to the I.M.E.A. Convention who can break away from official business for sufficient time. If they are able, as we were, to be present during one of the frequent visits of Mr. Frank Christy (chairman of the company) to his undertaking, and thus partake a little of his enthusiasm for the subject, they will be fortunate indeed.

In size the schemes cannot compete with those which fascinated so many delegates in Scotland in 1936, but the interest will be none the less because of the remarkable achievement in harnessing power to the extent of eight million kWh a year, largely by the skilful manipulation of tiny streams reconditioned for the purpose.

During the early years of the West Devon Co. many small undertakings in the area were purchased, including those of Christy Bros. & Co., Ltd., at Bude, in North Cornwall, and at Holsworthy in North-West Devon. A Diesel station was installed at Okehampton to meet the immediate needs of that district, and the linking up of all the small undertakings was projected with a view to taking a supply from the grid at a suitable point later on when the demand from the complete scheme justified the necessary capital expenditure on a main transmission line from, say, Exeter or Plymouth.

Above: South portal of old tunnel of Morwell Canal and flow-regulating gate. Left: Hillbridge Weir: the take-off on River Tavy for the Hillbridge scheme. Below: Morwellham power house [*Elec. Rev. photos.*

At about that time, however, it was discovered that certain water rights in the neighbourhood of Marytavy, which had been exercised for nearly a century on a very small scale for tin and copper mining operations, were available and they were acquired. As a result, three hydro-electric schemes are now in operation which will be able to supply 8 million kWh in a normal year. They work in conjunction with the Diesel plants at Marytavy, Bude and Okehampton, and the whole scheme is capable of supplying 11 million kWh per annum, the output anticipated by 1944. The total output for 1937 was 5.4 million kWh, of which 4.6 million kWh was generated by water, the 0.8 million kWh by oil plant being necessitated by the abnormal drought of last autumn.

During the greater part of the year the water turbines carry the base loads and the Diesel engines take occasional peak loads, but in time of drought this order is reversed and the Diesel plant takes the base load while stored water is used for the peaks.

The first hydro-electric scheme, developed in 1932, utilises the water of the River Tavy taken at Hillbridge Weir about 1¾ miles north-east of Marytavy. The water is conveyed about two miles along Hillbridge Leat (a small artificial stream) to a one-million-gallon reservoir, constructed by enlarging a portion of the leat, and thence by a 36-in. pipeline about 700 yards long to the power house in Marytavy village, where three 250-kW, 1,000-r.p.m. horizontal reaction turbines handle the water, operating under a 225-ft. head, and then discharge it into the same river at the lower level.

The second hydro-electric scheme, developed in 1934, also uses the River Tavy water, taking it at Tavistock about four miles south-west of Marytavy. The water is conveyed by a canal to a reservoir with a capacity of about one million gallons on the cliffs a short distance south of Morwellham, and thence by a 500-ft. pipeline down the face of the cliff to the two 340-kW, 428-r.p.m. Turgo-type turbines which operate under a 230-ft. head and discharge the water into the River Tamar. A third turbo-alternator of 500-kW capacity is to be installed at this station soon. The canal, which had been derelict for about 90 years, was constructed in 1803 for the conveyance of goods to and from the Tamar at Morwellham. It was 5¼ miles long and 1¼ miles of it was in a tunnel bored through the Morwell Down, issuing at the south end on the steep hillside above the Tamar. Goods were raised and lowered from one level to the other by an inclined railway operated by an 18-ft. water wheel.

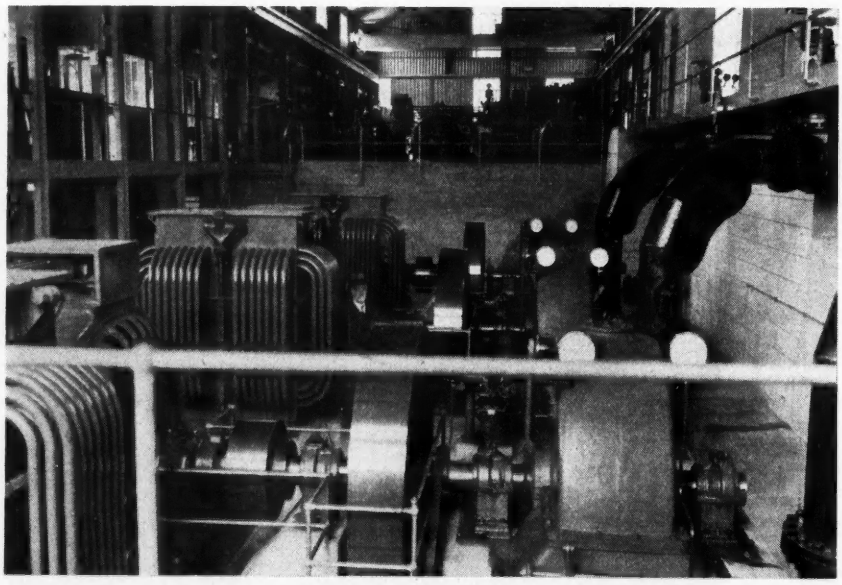
Two short additional tunnels were bored by the undertaking near Morwellham to take the water to a point on the cliffs more convenient for the reservoir. The canal has been leased

from the Duke of Bedford and over 20,000 tons of mud were removed from it during the necessary reconditioning. Exacting demands were made by the Duke and the Fishery Board to ensure that the fishing of the Tavy would not be interfered with, but the electrical arrangements adopted for automatically controlling the sluice gates at Abbey Weir, the point of intake at Tavistock, are maintaining the required river flow under all conditions with almost precision accuracy.

The third scheme, which was completed last year, again takes water from the River Tavy, this time at Tavy Cleave, a point about two miles upstream from Hillbridge and about 1,100 ft. above sea level. Reddaford Leat carries the water to a reservoir on Wheal Jewell Down, which, when completed, will have a storage capacity of about 5 million gallons at about 1,060 ft. above sea level. From the reservoir a pipeline carries the water for about two miles to three 750-kW Pelton-wheel turbines installed in an extension to Marytavy power house. These turbines, which operate under a head of 560 ft., also discharge their water into the Tavy, at the same point as the turbines of the first scheme.

Reddaford Leat makes a wide detour to the north-west before reaching Wheal Jewell Down and is about 4½ miles long. Constructed more than a century ago and derelict for many years it formerly operated a series of water wheels, leading down partly into the valley of the Gurgie and partly back towards the Tavy. Apart from the construction of the reservoirs a great deal of concrete constructional work has been carried out in the reconditioning and modification of the canal and leats; the connecting up of the Hillbridge leat to the reservoir of No. 1 scheme involved blasting a deep channel out of solid rock for a distance of about 100 yards. Each reservoir has a well-constructed screen house at the pipeline inlet and in each case the electrically driven screen scrapers are remotely controlled from the power station.

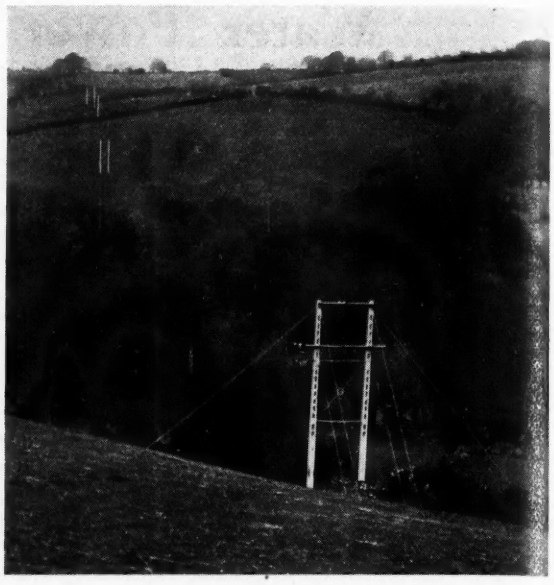
The River Tavy rises on Dartmoor and, like so many other moorland streams, fluctuates greatly in its rate of flow. About ten sq. miles of watershed feeds the Wheal Jewell scheme, the Hillbridge scheme has a watershed of about 14 sq. miles, while serving the Morwellham scheme there is an area of about 24 sq. miles. The average annual rainfall on the Wheal Jewell scheme watershed is about 80 in. A large portion of the water is "wasted" in flood, yet, after a few weeks of drought the river shrinks to very small proportions. Hence the necessity for the two 500-kW Diesel-engine sets which have been installed at Marytavy power house and which can be augmented by the 470-kW of Diesel plant at Bude when the river is exceptionally low. Useful peak-load service is also given by the Diesels when the water flow is somewhat diminished by mid-winter frosts.



Marytavy power house: 750-kW Pelton sets in foreground, Diesels and reaction sets in rear *[Elec. Rev. photo.*

All the alternators generate at 400 V, three-phase, but those at Morwellham and those of the Wheal Jewell scheme at Marytavy are "tied" to 400-V/11-kV step-up transformers. The Marytavy alternators of the Hillbridge scheme distribute *via* a 400-V switchboard, mainly on account of the 400-V local distribution in Marytavy village. For day-to-day routine work the operation of the whole hydro-electric generation is controlled by the senior shift engineer from Marytavy, but major control is effected from the headquarters at Tavistock.

The 800 sq. mile area served by the company is roughly a square extending from Yelverton in the south to Clovelly in the north and from Bude in the West to Chagford in the east.



[Elec. Rev. photo.

The 1,165-ft. span at Higher Gawton

Apart from the three load centres at Tavistock, Okehampton and Bude the area is particularly sparse, the population density being only 77 per sq. m. overall. Main transmission is effected from Marytavy by four outgoing lines to Okehampton, to Tavistock, to Brentor and Lifton and to Petertavy. The line to Petertavy will ultimately complete a ring main *via* Princetown to Chagford, but the other main transmission lines are already interconnected in ring formations. The main ring is Marytavy-Tavistock-Lifton-Bude-Holsworthy-Hatherleigh-Okehampton-Marytavy. At the moment Princetown still has its own separate d.c. supply. A ring to be completed this year is *via* Hatherleigh, Parkham, Clovelly, Kilkhampton, Bude and Holsworthy. All the main transmission is by 0.1 sq. in. overhead line at 11 kV. About 1,000 of the main-line poles are of reinforced concrete lattice.

The average line span is 350 ft., but some notable exceptions are: Parkham 1,035 ft., Bush 1,186 ft., Lumburn 1,070 ft., Higher Gawton, 1,165 ft., and Willestrew 1,000 ft. The very hilly and wooded country made constructional work on the lines very difficult, and a great deal of blasting and wood clearance was entailed. At the various load points along the lines pole transformers are largely used for transformation to 400/230 V for local low-voltage distribution. Excluding the Bude and Holsworthy districts there were in the area at the end of last year 327 miles of h.p. and l.p. lines and 114 transformer stations.

Supplies have recently been extended to Buckland Brewer, Brandis Corner, Blackaller, Clovelly, Chillaton, Easton, Endsleigh, Hartland, Horns Cross, Langtree, Marland, Melbury Meavy, Paynes Bridge, Sourton, Stibb Cross and Woolfardisworthy, while a sub-station, office and showroom has recently been opened at Clovelly. There is very little industry in the area, apart from some quarries and clay pits, and most of the output is for domestic supplies. There are now about 5,000 consumers connected and the number is increasing at the rate of about 20 per cent. per year.

Over 400 installations have been dealt with under the free wiring scheme, about 750 cookers are connected to the mains, a hiring scheme for 1½-gal. water heaters and wash boilers has been launched and hire-purchase facilities are offered for most types of apparatus. The capital expenditure is £450,000 and last year there was a trading profit of £23,388.

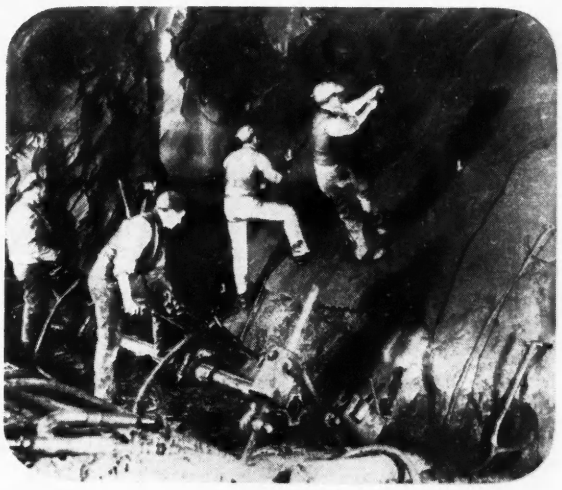
We are indebted to Mr. Christy and to Mr. H. W. Knapp, general manager, for their assistance.

The Electrical Aspect of Tin Mining

What part can electricity play in the revival of one of our oldest industries?

The supply of electricity to the Cornish tin mines is a difficult matter owing to the wide fluctuations in production. Nevertheless it is being accomplished with the result that the tin industry is being helped to produce the metal at more competitive prices

FOR many years now there has been a tendency to regard tin mining in this country as a speculation rather than as an industry. Very wide fluctuations in the market prices of tin, say, from about £60 per ton in 1896 to over £400 per ton in 1920, have contributed largely towards this outlook, but the position has also been influenced largely by the discovery of more easily worked deposits in other parts of the world—the alluvial tin of Malaya and Dutch East Indies for instance—which have proved a bigger attraction for British capital than has the lode mining at home. A result has been the steady and serious diminution in what has been and still may be Cornwall's main product, particularly since about 1915, when the average output was of the order of 5,000 tons of black tin per year, with a value of about £800,000.



Rock drilling in a tin mine

In 1936 about 180,000 tons of tin was produced in the world, and of this the United Kingdom contributed little more than 2,000 tons, although its own consumption was about 22,000 tons.

These are rather disconcerting facts, but another tendency coincident with the one referred to, but of more recent times, introduces a fresh hope. For various reasons and from different viewpoints it is becoming to be regarded as a matter of national importance not to allow tin and other metal production in Cornwall to cease. This change of outlook has to some extent resulted, and we hope it will continue to result, in investment in the mines by organisations of greater financial stability whose resources can not only afford relief firstly by levelling out the losses of bad times, but can provide for research designed to make present mining and ore-treatment methods more productive. Something like 20 per cent. of the metal content of the ore is still lost in the treatment. Further, greater financial backing can result in continued search for new sources of supply.

Hayle power station, the source of electricity supply to the mines

Hope in reviving the industry, then, lies in tackling it on broader lines and removing the gambling aspect. It is one purpose of this article to suggest that the electrical industry can probably help towards this revival and stabilisation of one of our oldest industries. Indeed, it has already done much very useful work along the lines indicated. At St. Agnes the Polperro Tin Mines, Ltd., last year opened up a mine which was cleared of water early this year. It is certain that had a supply of electricity not been available the mine would not have been free from water yet. And it is reasonable to assume that in a similar instance the shorter "idle capital" period could be the deciding factor for a new venture. With the change of outlook indicated the tin industry would become more like the coal industry which has reached a high state of efficiency largely through the assistance of the electrical industry. One of the greatest contributions to the stability of tin mining in Cornwall is the increasing reliability of public electricity supply. The tin-mining load of the Cornwall Electric Power Co. has always been of outstanding importance to the undertaking and Mr. D. H. Kendon, general manager, to whom we are greatly indebted for help in obtaining the impressions recorded in this article, both by the supply of direct information and by way of introduction to some of his tin-mining consumers, hopes and believes that it always will be so.

A Fluctuating Load

The extraordinary fluctuations of the tin industry referred to must necessarily have a serious influence on the position of the supply organisation, but with the continually extending field of electricity supply in the area the influence on electricity of alternating good and bad periods in the industry is becoming less marked, as is shown by the table on page 770. And this resulting greater stability of electricity supply must obviously have markedly advantageous repercussions on the working of the tin mining industry.

What worse load conditions could a supply undertaking have than those represented by the tin boom and depression years, respectively, of 1920 and 1921? Whereas of the total output of the undertaking for 1920 of 19.5 million kWh practically 18 million kWh was supplied to the tin mines, the great reduction of the mines supply the following year represented almost a similar percentage reduction in the overall output of the undertaking.

However, the steady growth of the other power and domestic and business supplies during subsequent years, irrespective of the tin-load fluctuations, introduces a much more hopeful note, with the result that the good-tin-year output of 1937 for other power and domestic and business supplies of 23.3 million kWh has made the undertaking less disturbing regarding the current year's tin-mining slump.

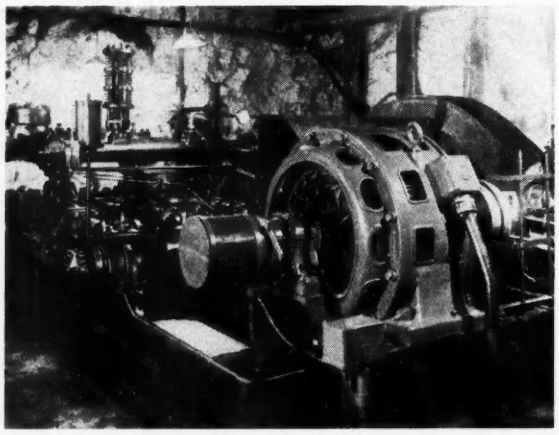
The following statistics relating to the South Crofty mine, one of the largest of the mines now working, give a broad idea of the extent of the use of electricity in tin mining. The

total output of the mine for a recent year was about 65,000 tons of ore crushed and the total consumption was about 2,000,000 kWh. About half of this consumption was taken by the air compressor plant, and about half by the dressing plant. But the latter plant has a much better load factor, for of the overall maximum demand of the mine of 636 kW the compressor load was 460 kW. The installed h.p. for various operations is: underground pumping 350; crushing and dressing 418; air compressing 765; and sawmill and workshop uses 36. Steam, largely for pumping, is used in this and other mines in varying proportions, so that the figures are not strictly representative and certainly not indicative of the possible extent of the use of electricity. Broadly, however, the compressor load represents the underground or actual tin-winning uses and the dressing load represents the above-ground or tin-treatment uses.

OUTPUT IN MILLIONS OF KWH OF THE CORNWALL ELECTRIC POWER CO.

	1920.	1921.	1927.	1931.	1937.
Tin mines	17.9	4.8	19.7	2.2	14.2
Other large power... ...	1.2	0.8	2.1	2.2	6.3
Domestic and business ...	0.4	0.4	1.7	4.3	17.0

Very briefly, Mr. Clarence Paull, general manager of the South Crofty mine, told us that tin-bearing lodes are almost vertical fissures extending down through the slate into the granite mass. The lodes are developed by means of cross-cuts at different levels from a more or less central shaft and again by "drives" on the lodes from the cross-cuts. Gradually, in step formation from level to level, great caverns are formed as the rock is drilled, blasted and hauled away, suitable pillars of rock being left at convenient points for the necessary support of the walls of the lode. The old Levant mine, adjoining the Geevor mine near Land's End was developed for 1¼ miles out under the sea. Compressed air is used extensively for drilling the rock for these underground operations and its supply represents a considerable electrical load. Serving the New Cook's Kitchen section of the South Crofty mine there are two vertical compressors with capacities of 1,900 cu. ft. and 1,580 cu. ft. of free air per minute and driven by 190-h.p. and 300-h.p. motors, respectively. At the mine of East Pool & Agar, Ltd., there are two 1,000-cu. ft. per minute horizontal compressors each driven by a 220-h.p. motor, in addition to small vertical sets.



Underground electrically driven pump at the South Crofty tin mine

Old Pumps Converted

Compressed air is also used underground to some extent for pumping, but in this connection there is still in Cornwall great faith in the old Cornish pump, with its associated beam-engine drive, its huge timber main rod down the shaft, and the pole connections. But there are some excellent examples of underground pumping installations, *e.g.*, in the South Crofty mine a pump driven by a 350-h.p. motor delivers 450 gallons of water per minute to the adit under a head of 800 ft. Faith in the Cornish pumps is illustrated in a few instances by the adaptation of the electric drive—a curious combination it seems to the "outsider." There are two such drives at the Wheal Reeth mine. For one of these the pump, which is 500 ft. deep and has a 10-in. plunger and a 7-ft. stroke, is driven by a 60-h.p. motor through belt and gears. It handles 240 gallons per minute in ten strokes. A similar pump at the East Pool mine has a capacity of 400 gallons per min. and is driven by a 30-h.p. motor. The stroke is 8 ft. and the lift is 75 ft.

The rock, with a tin content of only about 1¼ per cent. is removed from the mine in sizes up to about 10 in. × 18 in., and for this purpose considerable use is made of the electric winder in a similar manner to coal mining, although the equipment is much simpler. The hoist at Wheal Reeth hauls a ton load up the 400-ft. shaft at 600 ft. per minute. The double-drum winder is served by a 65-h.p. motor with "straight" control *via* a drum starter. The first operation above ground is crushing and the crushers are usually installed in the shaft headgear, say, 40 ft. above ground. In the case of the East Pool mine the dressing plant is 1¼ miles from the shaft and the rock is conveyed by an aerial ropeway with a 30-h.p. drive and a capacity of 40 tons per hour. The rock is dumped on to a grizzler screen from which the oversize is fed to the crusher, the fines from both the crusher and the screen joining later in the ore bin. The two crushers at East Pool are driven by 50-h.p. motors and will deal with 125 tons of rock in 7½ hours, reducing it to about 2-in. screen size.

From the ore bins at the dressing plant the 2-in. rock gravitates to stamp mills which further crush the rock to sand which will pass a 15 mesh screen. A battery of stamps at South Crofty has 60 heads in six units. Each head weighs 1,050 lb. and operates with 98 drops of 8 in. per minute. Each unit is driven by a 30-h.p. motor and the crushing capacity is 4 tons of ore per head per 24 hours. The principal contents of the concentrates are tin, wolfram, iron, arsenic ore and heavy waste. The arsenic is usually first liberated by calcination, the volatiles being condensed in the very long furnace flues at ground level.

Magnetic Separation

In each of the separators at South Crofty a belt conveyor carries the concentrate between the pole pieces of a line of three sets of magnets. Between each belt and each top pole piece there is a cross belt. The magnetised iron or wolfram is thus lifted from the concentrate towards the upper pole and carried on the cross belt out of the magnetic field where it is released and dropped into chutes. In the direction of travel of the concentrate the pole strengths are successively increased. The weaker poles remove the iron and the stronger poles remove the wolfram which requires about ten times the "pull" necessary for iron. The separators are served by an 8.5-kW 110-V m.g. set.

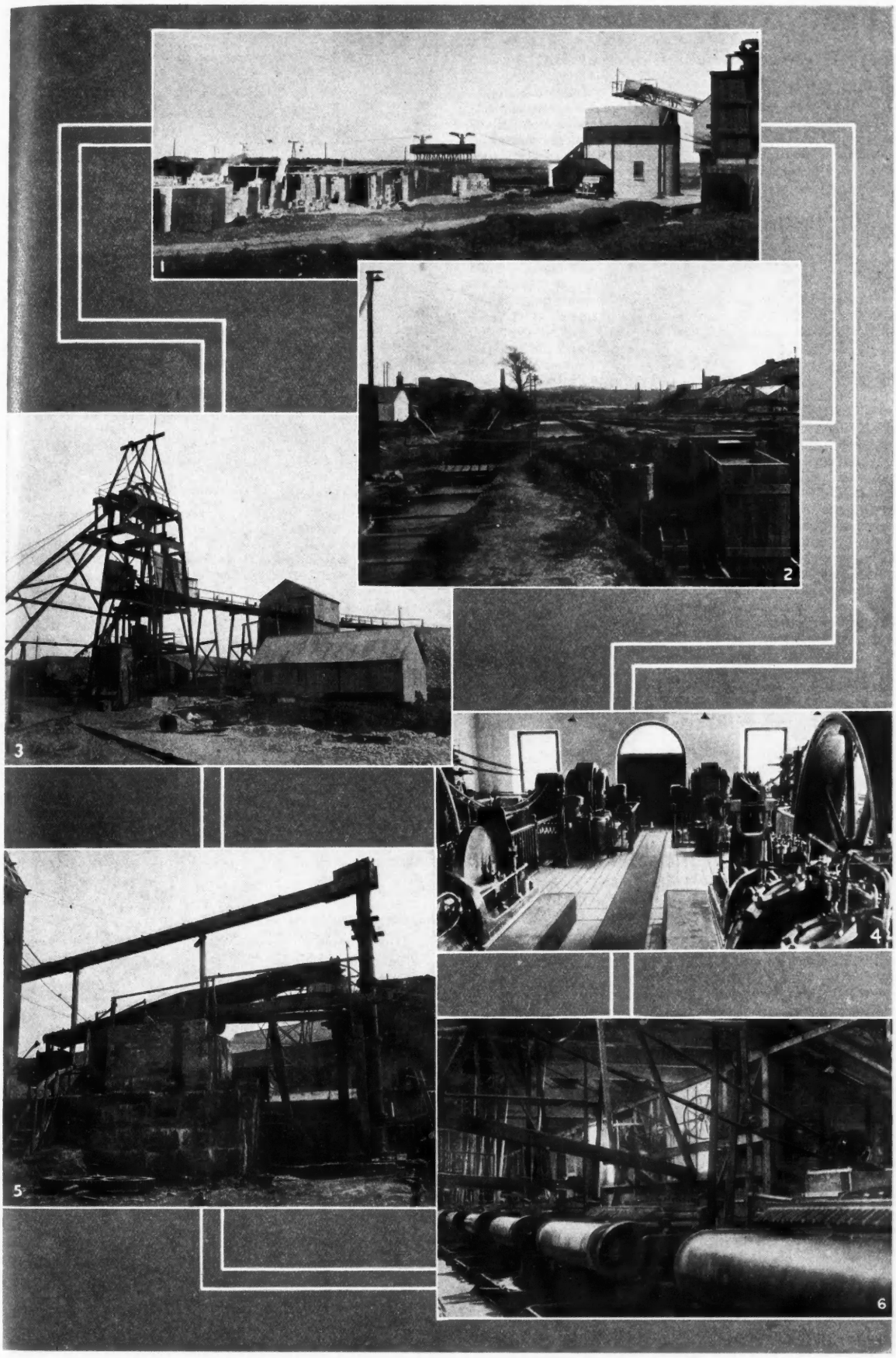
Finally, the cleaning of the actual tin is effected by gravity which embraces a very wide sequence of processes, varying in character somewhat in different tin works. Each process is designed to further separate some of the tin passed by the previous process and the sequence is carried on until it would be no longer a financial proposition to carry it further. Roughly, the principle is to cause the heavier tin to separate from the other materials as the mixture, suspended in water, flows over tables, through launders, in buddles, etc. The greater part of the tin is recovered on separating tables and these are responsible for the greater use of electricity. During the flow, side-to-side shaking motion is imparted to the table in some cases, causing the tin to take a path different from that of the water and other material. A good deal of elevating is required in most works, because the whole concentrating process depends on gravitation, and a form of water wheel is a popular equipment for this purpose. Further grinding and pulverisation of the concentrate residue is also undertaken at various stages to further assist separation. A typical group drive for dressing plant is that at South Crofty, in which a 17-h.p. motor serves two wheel elevators, five tables and two pulverisers.

With all this separation about one-fifth of the tin "escapes" and the final concentrate sold to the smelters contains about 70 per cent. tin metal.

The tailings from the works in the dense mining district of Carn Brea are discharged into the Red River, an artificial stream possessed by the mineral owners which flows into St. Ives Bay. Settlement in this stream renders it profitable to undertake further separation at various points and so there are several tin stream works situated along the river. With grinding, concentration and dressing plant similar to that of the larger concerns these tin-stream works provide loads varying from 10 to 20 kW and consume up to 50,000 kWh per annum.

But even this is not the end of this remarkable story of "living on the other fellow's leavings," for on the shores of St. Ives Bay the Beach Tin Operating Co. has installed an extensive plant by which it is profitable when the price of tin is high enough to extract the metal from the sand in the dunes. The wind-blown sand contains tin eroded from the outcrops of the lodes and discarded tin-works tailings accumulated during the past century or so, said Mr. D. D. Belsham, manager of East Pool & Agar, Ltd.

In addition to Mr. Kendon and the various mines managers and engineers we were fortunate enough to meet, we are also indebted to Mr. E. Todd, district manager of the Cornwall Electric Power Co., for assistance in collecting the above information.



Electrical plant at the Cornish tin mines

1. Aerial ropeway from East Pool mine to works. 2. Looking up the Red River, showing a tin-stream works and the East Pool (left) and South Crofty mines. 3. Headgear at Wheal Reeth. 4. 1,000 cu. ft. per min. air compressors at East Pool. 5. Beamgear of electrically driven Cornish pump at Wheal Reeth. 6. Separating tables at South Crofty (1 to 5 ELEC. REV. photos.)

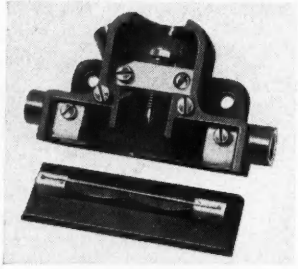
Time Switch Production

A new electrical works at Bath

CONSEQUENT upon rapid growth of business the Horstmann Gear Co., Ltd., has found it necessary to embark upon a comprehensive scheme of reorganisation for its electrical department, and an important part of the scheme is the establishment of the new Albion Works at Bath, with about 15,000 sq. ft. of floor space which is devoted solely to the assembling of time switches and other electrical products and to service work. As the fundamental idea behind this reorganisation is the complete separation of the electrical activities from the other work of the concern, the new works is self-contained with its own management under Mr. B. G. Horstmann, and the commercial and sales staffs also operate from the new address.

Further, the electrical products, including new and modified models, will now be known as "H.B.E." instead of "Newbridge." We are sure that Mr. Horstmann and his staff will welcome any I.M.E.A. delegates who may care to add interest to their West Country trip by a visit to the new works at Bath. Time switches, time-switch controlled contactors, automatic protection gear and cooker controls, are some of the lines which are, and will be, marketed from the new works.

The new range of time switches includes street-lighting models for unit, group and special controls, new window-lighting and water-heating control models and time switches for industrial purposes, covering in all a current range from 2.5 to 600 A. Synchronous-motor driven (with or without reserve spring storage) and hand and electrically wound equipments are included, while solar dials provide for any desired lighting and extinguishing schedule.

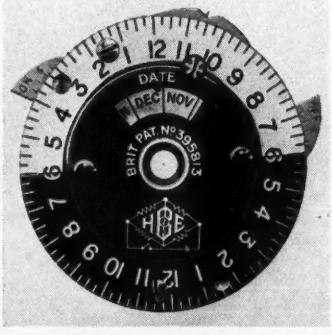


The "Neorupt" neon-installation protection unit

Of particular interest is the "H.B.E." synchronous motor which is of the reaction type and is so designed as to be unaffected by secondary voltage impressions and wave distortions. It is commercially balanced, so that the dead-point angle is reduced to a minimum, rendering self-starting certain. The motor will self-start on a frequency range of from 44 to 56 cycles, and at 140 V, and it will continue to run on down to 60 V. The synchronous torque is about 14.2 gm.-cm. and the loading is about 1.68 W. The motor is embodied in the new type "K" 10-A time switch which has been specially designed for use where space is extremely limited. A test push-button is incorporated and where it is desired to eliminate a separate cast-metal case, suitable fusing arrangements may be incorporated in the switch base.

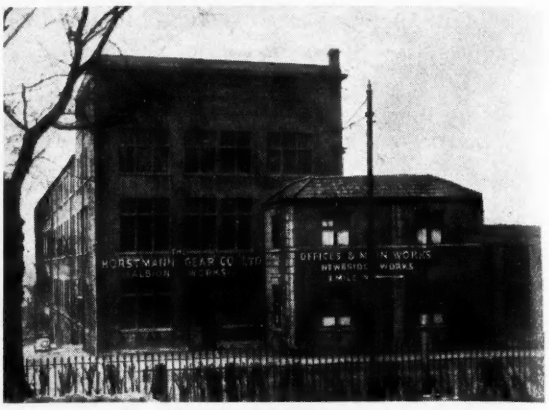
With the exception of the British-made escapement, practically all the components are made by the company, including all the wheels and pinions whose special material, after heat-treatment, provides hard skin surfaces with soft cores—an assurance against pivot breakages. Finally, perfect timing of the movement is ensured by the installation of watch-rate recorders which are so sensitive that, in addition to detecting timing inaccuracies up to one second per day, indicate also escapement faults that would otherwise be impossible to detect commercially.

Experience gained in its notable war-time production of precision gauges has enabled the company to effect mass production to exceedingly fine limits, linking up one production with another, which involves designing units which have parts of their mechanisms common with other components. For example, the clock train of the reserve-spring run is the same as is used in the 15-day 3-A movement, and the electrically wound movement has the same train as the 15-day model. Hence, by arranging production in this manner the company is able to utilise high-class repetition machines for very large runs. A separate tool- and jig-making department specially equipped for this class of work is able to deal with any eventuality that may arise in respect of manufacture.



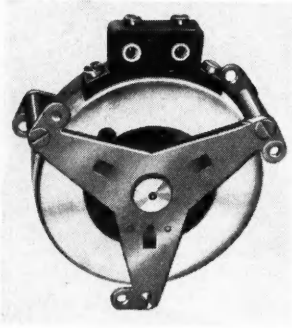
A solar dial providing for any lighting schedule

Aluminium is being increasingly used for such products as weatherproof boxes, and to render this material suitable for use in extremely bad atmospheric conditions a special chemical process is used which, in addition to removing all trace of dirt and grease, renders the surface of the metal immune from the action of sea water and provides a surface to which spray paint will adhere much more closely. All plating, including hot and cold chromium, cadmium-copper and zinc, is carried out in separate buildings which form a part of the factory.



The new Albion Works

Another new product, the "Neorupt" fuse has been designed to render the whole of a neon installation dead in the event of a secondary circuit being broken or a tube becoming soft. The unit is simple and is readily and easily fitted in any neon installation. It eliminates practically all risk of fire and removes the possibility of an attendant receiving a fatal or severe shock when under the impression that the installation is disconnected because the sign itself is not illuminated, which is always a possibility.



The "H.B.E." self-starting synchronous motor

The value of this device is further enhanced in connection with air raid precaution developments, as it is reasonable to suppose that in the event of a first air raid some neon lighting would be left "on" due to there being no attendant on the premises.

Even with the fire switch there is always the possibility that in panic the sign would be smashed, and unless suitable precautions were incorporated the risk of fire resulting would be very considerable.

Considerable research work has been undertaken by the company into the complex problems arising out of the emergency control of public lighting during possible air raids, and a practical control unit has been produced which can easily and conveniently be fitted not only to street lighting installations, but to any lighting installation over which it is desirable that the authorities should exercise an extinguishing control, as distinct from that already provided. Under this heading would come such things as neon signs, electrical decorative and advertising displays, and general private external illumination schemes.

A simple control unit has been developed and its installation does not involve the scrapping of existing control arrangements. It is immune from the possibility of unauthorised use for re-illumination purposes—a point of very considerable importance. Further, when actual control is in process of being exercised all other gear remains entirely unaffected.

The use of the device has the effect of providing a general air raid warning. The extinction of the lighting is effected very rapidly and the cost of the unit is comparatively small.

Among a variety of other new devices which have recently been developed by the Horstmann Company is a cooker time control.

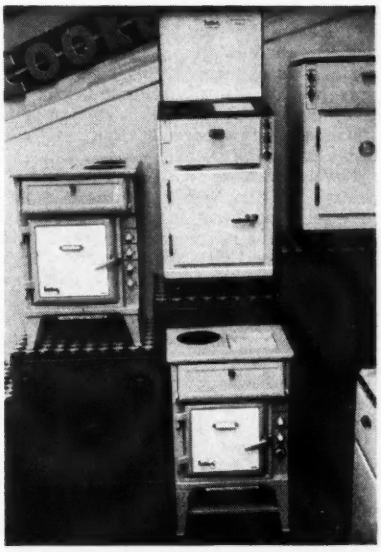
A Survey of the I.M.E.A. Exhibition

In our last issue we gave stand-by-stand details of the exhibits arranged at Torquay by the British Electrical Development Association. The following is a survey of the show by our special representative containing an appreciation of the trend of development in the various domestic uses of electricity

TORQUAY, MONDAY.

I BELIEVE that the gradual growth during the past few years of what might be termed the superior-finish cooker, culminating for the moment in the various types of "streamline" equipment on show at Torquay, has almost reached a point when it will represent a major and somewhat ticklish problem for the industry. This conclusion is derived from the fact that the development has been linked so largely with the tendency, in some quarters, to increase the use of sheet-metal without, it seems to me, a full appreciation of what lies behind the introduction of pressings.

There can be no harm now in recalling the introduction several years ago of the now so familiar mottled finish and the "hush-hush" explanations of the fact that whereas the "pores" of the normal castings were revealed by plain vitreous enamel finishes, no offence to the eye resulted from the application of "mottled effects." The better finish possible with sheet-metal has been behind one method of approach then, and Moffats, Ltd. told me that generally a definitely better finish can still be imparted to the pressing.



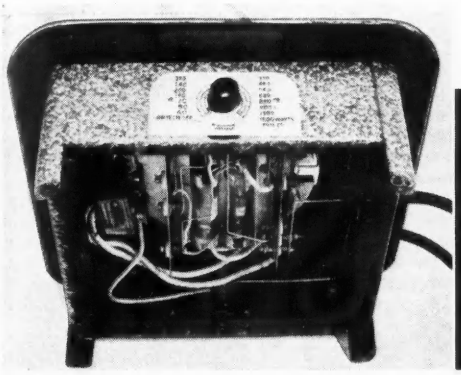
These cast-iron and sheet-metal Belling cookers are practically identical electrically

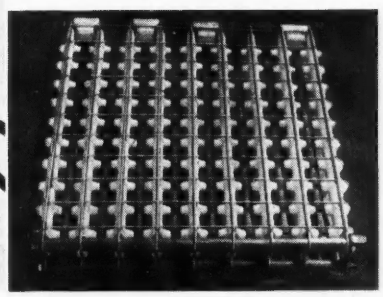
connection with his company's "streamline" cookers, which have now reached the commercial production stage, by the way. He said that the recent greater use of the modern finish is on account of improvements in pressed-metal design which give greater scope to the vitreous enameller. The Belling "No. 63" sheet-metal cooker costs roughly £2 more than the "No. 43A" cast cooker, and, electrically, the two equipments are practically identical.

On the score of cost a very curious position may arise. Moffats say that the extra cost of the "de luxe" cooker is "buried" in the tool costs, but, as in other fields, these would be cut drastically with large-scale production, so that the cheaper cooker may one day arise out of the present superior-finish equipment. Mr. Turner (Tricity), said that his company contended that a 20 per cent. reduction in loading for the pressed-steel cooker was possible as there is much less metal to absorb heat. A cast and a pressed Tricity cookers each have a 14 in. by 15 in. by 12 in. oven. With a 2-kW loading the cast unit heats up to 400 deg. F. in 20 min. and the pressed equipment in 14 min.

I think I can detect a certain consolidation of ideas arising from the remarkable complexity of schemes of the past three years or so pertaining to gas-ring competition. With the effort to increase loadings, at almost any cost it seemed to me at one time, has come a more frank recognition of the fact that with the increased control of the crude heat of the gas ring the "loading" has been lessened. So load is not everything then, and I will not accept any suggestions that electricity must take second place in control facilities.

The four-heat plate has secured a hold, but I was not prepared for anything like the advance represented by the ten-heat plate introduced by Tricity. My first reaction was to accept that as good enough for infinitely variable control, but then I was shown the really infinitely variable-heat unit of the Metropolitan-Vickers Electrical Co. The latter affords perfectly smooth load regulation from 40 W to 1,600 W and the equipment incorporates a Sun-Vic tube. An experimental model is shown serving a table unit. I saw two of the ten-heat plates

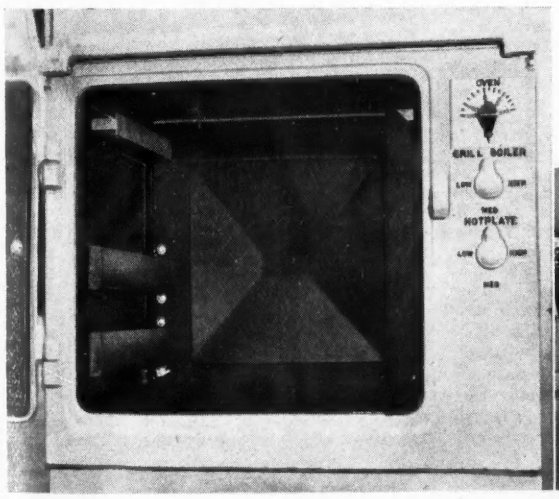


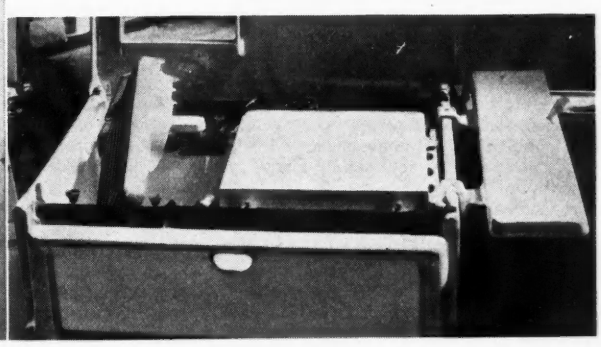


Left: Met.-Vick. infinitely-variable heat regulator fitted to a breakfast cooker. Right: Construction of open boiler-grill (Rubery Owen)

I was impressed by some excellent modern finishes on cast equipment. The "streamline" cooker of the Jackson Electric Stove Co., Ltd., for instance, has just as much cast work as one of the company's ordinary hiring-scheme cookers.

American practice also has a bearing on the matter, I think perhaps more so than is generally admitted in view of the American lead in the refrigerator field. But there are special reasons for the American pressed-metal cooker I am told. Weight reduction is an important economic factor because of the long distances equipment has to be transported. Mr. Curry, of Belling & Co., Ltd., assured me that no attempts at weight reduction or price lowering have been attempted in





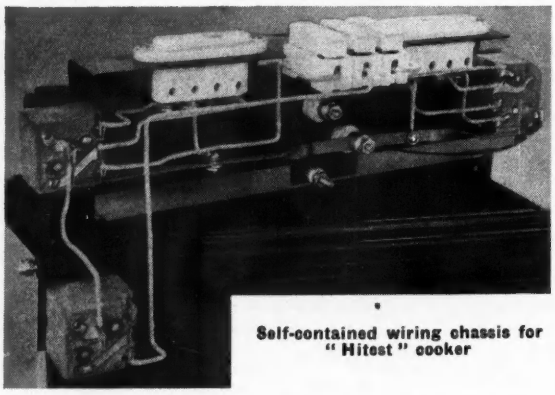
Left: Oven arrangements of English Electric cooker specially designed for thermostatic control. Right: Housing arrangements of the Backer-Jackson hotplate

on one cooker. They are both really open plates—one 2.4 kW and one 1.2 kW—and both step down to less than 100 W.

It was almost alarming to see quite a number of open plates again after so many years, but the care given to design is very marked. In the boiler-griller of Rubery Owen & Co., Ltd., for instance, the greatly upward projecting insulated partitions result in an actual "shorting" distance between adjacent elements of 2⅜ in.

I would not say that Simplex, Ltd., are averse to finer control, but Mr. Nesbitt told me that they do not favour the four-heat plate because the second heat is regarded as redundant. He was referring to the new "Trident" plate which, like the older "Triplate," dispenses with the usual series-parallel control to obtain more convenient loadings—2,000 W, 750 W and 220 W in this particular case.

I heard excellent reports of the already established four-heat plates. That of the Revo Electric Co., Ltd., for instance, now represents a large proportion of the company's output. I have found confirmation of the attitude that load is not everything



Self-contained wiring chassis for "Hitest" cooker

in the solid but light-metal hot plate, and although there is much talk of the "visible" heat I think that increased dissipation area is the real direction in which some minds are working; at any rate, I cannot help making my own comparison between the increased dissipation area idea in connection with both water heaters and hot plates.

After all, from a limited aspect, the two developments have similar aims. The "Backer-Johnson" plate, with its embedded tube elements, is not too badly off for loading all the same, for there is 2 kW in 8½ in. by 6 in.

Rubery Owen appear to be satisfied with the quick heating of their corrugated-type plate, but Mr. Rogers told me that in limiting the load to 1,450 W for a 6½-in. by 6½-in. plate, they are keeping a strict eye on the plate life. I have been curious to know what would be the effect of the mains voltage plate on the transformer plate. Mr. Mason, however, assured me that the "Superspeed," in its own particular field, has felt none of the half-expected repercussions.

What I think is the most encouraging thing about the low-voltage plate is that it is handled on a large scale by undertakings like Croydon and Leicester, in spite of the fact that the initial cost is at least 200 per cent. greater. The explanation, of course, is the practically negligible maintenance cost. I confess to a leaning towards the transformer plate, and so I share some of the pleasure of Mr. Bickell (British National Electrics, Ltd.), in introducing the "Ultraspeed" (7 in. dia. effective area, 1,500 W, 13 V). Direct contact between element and utensil is behind the "pull" for speed this time (1 pint in 3.75 minutes) and, roughly, the element temporarily distorts itself to the shape of the utensil bottom.

Automatic Cooker Control

What a change the exhibition has shown in, say, three years with regard to automatic control. Now the exception is an exhibit without the thermostat. That doesn't mean that automatic control is now generally accepted, however—from from it, and I have received an impression of some sort of standardisation in the phrase "We can fit the thermostat if required."

It is the greater attention given to design that pleases me most. For instance, the English Electric Co., Ltd., stresses the point that its cooker is built round the thermostat and the idea, said Mr. Fraser, is to eliminate all radiant-heat effect and obtain the maximum convected heat. Satisfactory convection can only be obtained by giving proper attention to the disposition of the elements in relation to the circulating arrangements. Falk, Stadelman & Co., Ltd., Moffats, and Carron Company, all have special oven circulation arrangements with the object of obtaining even heat distribution.

Recent discussions on the advisability of incorporating a main switch in the cooker itself are reflected at Torquay. On an exhibit of the General Electric Co., Ltd., there is provision for a main switch, but Mr. Pickering said they have had no real call for it as yet, but they are prepared. Simplex Electric Co., Ltd., are out to forestall possible objections by interlocking the main switch with the hob and the switch box and as the oven interior is screwed in no live part is accessible with the switch "on."

Water Heating

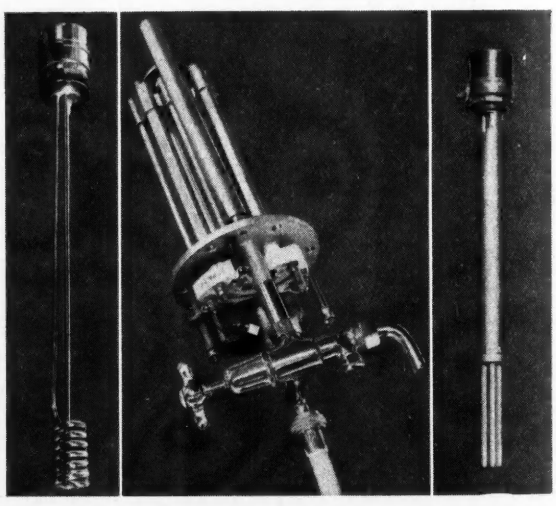
While several of the water-heater manufacturers spoke of a growing demand for unlagged hand controlled equipment, I think the general feeling is that the thermostatically controlled water heater is so fundamentally sound that it is not likely to lose the position it has won and that the newer equipment is regarded as more or less temporary or for a limited field. I have found, however, a tendency to introduce the thermostat to unlagged equipment. For instance, Drake & Gorham Wholesale, Ltd., have a 12-gal. 4-kW unlagged heater available with hand or thermostatic control.

There is a thermostat in the new hand-controlled 12- and 8-gal. 4-kW equipment introduced by Heatrae, Ltd., but it is intended to act only as a pilot. Mr. Knight told me that this heater has been introduced to secure business in connection with the new property erected in slum-clearance schemes where limited purses and limited hot-water use make standby losses of storage equipment a retarding factor. Higher loadings, however, are not exclusive to unlagged equipment and there is evidence of increasing confidence in this respect.

The new barber's heater of Ferranti, Ltd., is an example of this. The capacity is 1½ gal. and the loading is 2 kW. But of greater interest in connection with this equipment is the contribution to the low-load density theory for the prevention of furring. Within the usual apparatus-plate space there are two groups of elements with four members in each and the load density is only 7 W per sq. in.

Mr. Taylor (Santon, Ltd.) spoke favourably of low-load density for scale prevention against the idea of high-load density as a means of "cracking" formed scale off the elements to collect in the bottom of the heater. The scheme of Johnson & Phillips, Ltd., of housing the cold-water feed pipe in the lagging to obviate furring is proving successful, I understand, and one of the scale-prevention schemes for the siphon cap which impressed me is the Drake & Gorham idea. A piston lifts when the water enters the heater and thereby lowers the cap into the position for drawing water. When the piston is down the cap is out of the water.

I was pleased to learn from Santon of an effort to get greater satisfaction out of the circulator by way of the dual-service demands made upon it, for I have often found that satisfactory operation by way of quick small-quantity supply has rendered the general service performance less efficient. The normal order of things is reversed and instead of a very free intake

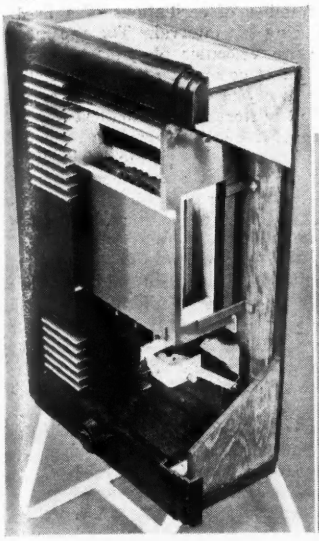


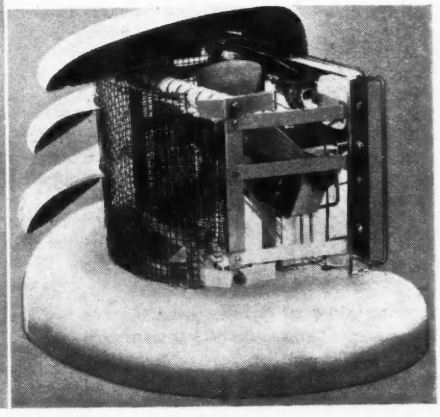
Left: Archibald Low immersion heater with load concentration at end. Centre: Ferranti low-load-density unit; two banks of elements. Right: New Santon circulator, showing restricted inlet and free outlet

and a restricted outlet the bottom of the circulating tube is closed and there is quite a small hole for the inlet and large holes at the top. Further, the elements protrude beyond the circulating tube so that there is ordinary immersion-heater operation for general service. I like the dual-service scheme in the Heatrae hand-controlled heater, too. At the top there is a lagged tank which holds about one gallon. Hot water for the circulator cascades into this tank and a gallon of water

(*Concluded on page* 775.)

at 140 deg. F. is available in five minutes. Archibald Low Electrics, Ltd., told me that their "concentrated" immerser, with its coiled tube element at the bottom end, had a circulator effect in that the quickly heated water at the bottom tends to rise in a column. Subsequently, normal distribution gives the ordinary immersion-heater operation as the other part of the dual service. A concentration of load for confined space is the main idea behind the development of the side-entry circulator of Aidas Electric, Ltd., and the rectangular shaped heating chamber (9½ in. by 5½ in. by 1½ in.) is probably the most unconventional device to be seen among the water-heating exhibits.





Left: Construction of Thermovent inset convector. Below: The H.M.V. forced-air circulator

The last thing I should like to see would be the disappearance of any of our so far accepted forms of low-temperature heating, but it seems that claims by some of the convector manufacturers that the outward direction of the air currents from the equipment is a safeguard against wall blackening might arrest the development of such equipment as the tube and panel. The irony of the position as I see it is that the very wall blackening referred to is the result of genuine convection.

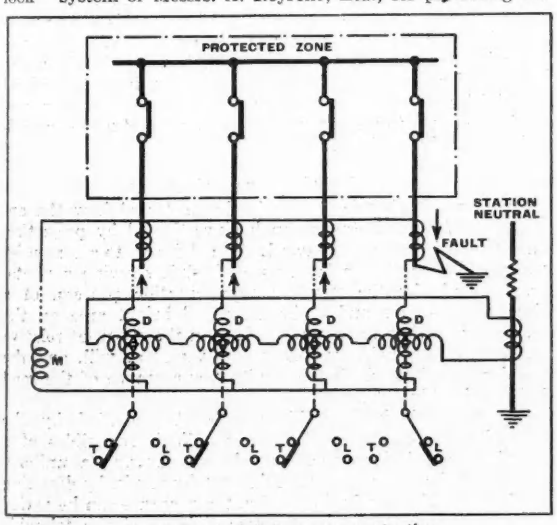
I have seen no signs of any real concerted effort to settle the problem arising from the conflicting ideas of convector loadings, but I am more than pleased at the attention given in some quarters to design to effect scientific airflow. In the Thermovent Heating equipment, for instance, there is the element unit in ribbed castings within an inner duct and then there is a secondary outer duct, all within the case, which is subjected to room-temperature air only.

H.M.V. Household Appliances threw a little new light on the question of forced air circulation. Their room heater which embodies this principle does not afford any degree of radiant heat, yet it was described to me as having a "radiant-heat effect." This may point to a deficiency of the convector for limited domestic use in that the quick service of the electric fire is missing. The point is, I think, that the downward directed hot-air stream impinges on the body with a similar pleasant effect to that experienced by direct absorption by radiation.

Summing up the exhibition, I think it can be said that satisfactory advance is being made towards providing the best service to the user for electrical appliances in the home.

Bus-zone Protection

IN the description of the new switchgear at Willesden power station (comprising some sixteen 33-kV panels and thirty-six 11-kV panels) that was given in the ELECTRICAL REVIEW of May 13th, reference was made to the instantaneous "Dualock" system of Messrs. A. Reyrolle, Ltd., for protecting the bus-bar zone. This we believe to be the first installation embodying all the details here described. This name has been given it because two independent locking features are provided, giving two lines of defence for stability. One is based on Merz-Price and the other on interlock principles, and both must operate before tripping occurs; also, auxiliary switches are eliminated from current-transformer circuits.



The "Dualock" bus-zone protection

On the Merz-Price principle, the current entering a group of bus-bars is compared with that leaving it and so long as there is no unbalance the master-protective relay, M in the diagram, remains inoperative. For the second line of defence there are directional discriminating relays, D (one per circuit). One coil of each relay is energised by fault current in its associated circuit and the other by the total fault current fed into the bus-zone; the relay contacts L close when fault current flows from the bus-bars, as in the diagram which shows the position of the contacts on a straight-through fault, but the contacts T close when fault current flows into the bus-bars on an internal fault occurring on the other side of the circuit-breaker. The closing of L in any circuit energises a master lock-out relay (not shown) that initiates the tripping of all circuit-breakers controlling the section, but the master tripping relay can only be energised if the master lock-out relay is not energised, which means that the lock-out takes precedence of the tripping function. A bus-bar section therefore cannot trip if there is a single circuit carrying fault current away from it (external fault), but will trip if some or all circuits are carrying fault current towards it (internal fault). An alarm relay provides an indicator if the protective gear circuit is out of order.

Core balance or line-current transformers (preferably the former) are required and in addition to the master relays associated with the whole of the bus-bars (which are all that are required for the self-check system) a relay must be provided for each circuit.

When applying the method to existing switchgear where the current transformers on all the circuits may not be well balanced against one another, a time-lag feature is used instead of the Merz-Price system. Other modifications can be made to suit different conditions of operation.

I.E.E. Liverpool Centre Golf

THE Mersey & North Wales (Liverpool) Centre of the Institution of Electrical Engineers held its annual golf competition in aid of the benevolent fund of the Institution on May 11th at Blundellsands by courtesy of the West Lancashire Golf Club. The weather was perfect and over 100 members and friends spent an enjoyable day. The first prize in the singles (against bogey) was won by Mr. F. N. Pardow, and the trophy for the best score by a member of the Institution in this event went to Mr. C. A. Britton, of Chester. Messrs. M. D. Clark and P. W. Davis, the latter being a former winner of the trophy, won the first and second prizes in the singles medal play competition for players with handicaps of 13 or under. In the class for handicaps of 14 and over, Messrs. F. A. Leonard and C. A. Britton took first and second prizes. The first prizes in the four-ball against bogey event were won by Messrs. W. H. Metcalf and G. S. Butler after a tie with Messrs. W. J. Thomas and R. Nielsen, who won the second prizes. The putting competition was won by Mr. W. Newman, Mr. F. G. Briant being second. At the close of play the chairman of the Centre, Mr. G. K. Paton, presided at dinner in the clubhouse, Dr. E. Allan, captain of the West Lancashire Club presenting the prizes.

The Royal Society's Soirée

Electrical exhibits reviewed

Many novel devices, produced largely by research workers, were on view at Burlington House last week. Methods of measuring various quantities and effects by electrical means were some of the most interesting items

At the annual evening conversazione of the Royal Society (president: Sir William Bragg) at Burlington House, Piccadilly, on May 18th, the customary scientific exhibits and demonstration apparatus numbered fifty-five items, of which twenty possessed some electrical interest.

The National Physical Laboratory showed a new form of cylindrical quartz ring oscillator for use as a standard of frequency and time (Mr. L. Essen) to which reference has been made before; also cathode-ray oscillographic demonstrations of the spectral analysis of noise (Dr. G. W. C. Kaye and Dr. J. F. R. Constable).

Apparatus specially designed for photographic research by Ilford Ltd., included a stabiliser whereby a smooth d.c. is obtainable from ordinary supply mains for feeding amplifiers; and an automatic timing device for providing an electric impulse lasting for a predetermined time (from one second up to 500 minutes) for accurate control of exposures.

The Brown-Firth Research Laboratories showed a voltage controller that has been made to maintain a steady temperature with electrically heated "creep" test specimens. The experimental results obtained by the Metropolitan-Vickers Electrical Co., Ltd., from the investigation of order-disorder transformations in alloys was illustrated by photographs and graphs indicating the change in resistance accompanying the growth of nuclei in copper-gold alloy, which work has been done in conjunction with the British Iron and Steel Federation.

The British Thomson-Houston Co., Ltd., had several items on view A high-speed recurrent surge oscillograph of the cathode-ray type was used to demonstrate waves reflected from the end of a cable under differing circuit conditions. How arc ignition in mercury pool cathode tubes can be timed precisely as often as desired without moving parts, was shown by such auxiliary circuit control as (*a*) applying a high voltage impulse to an external electrode, (*b*) passing current through a high-resistance igniter that dips into the mercury, or (*c*) through an independently heated low-resistance igniter in the pool. There was also a shield-grid thyratron so constructed that the control grid is partially screened from the arc stream, thus reducing the grid current to a very low value and enabling the tube to be controlled direct from a high-impedance regulating circuit so avoiding the amplification hitherto needed when a thyratron passing, say, 6 A or more had to be controlled by variations of light falling on a photocell.

A miner's pneumatic lamp energised by a self-contained generator driven by compressed air, as manufactured by John Davis & Son (Derby), Ltd., and incorporating various safety features, was shown fitted with a 40-W mercury vapour bulb of the B.T.H. high-pressure discharge type.

The Building Research Section of the Department of Scientific and Industrial Research had an acoustical strain gauge on view which consists of a thin wire stretched between two knife-edges, forced into the material under test by suitable clamping arrangements. The wire is maintained in continuous vibration at its fundamental frequency by a thermionic valve circuit. Variation of the strain in the wire and therefore in the material produces a change in the vibration frequency of the wire, which is measured by aural comparison with a standard wire, also maintained in continuous vibration.

Molecular Spectra

Two discharge tubes were shown by Drs. W. B. Pearse and A. G. Gaydon for the production of the spectra of molecules with high intensity, one of them for use with refractory materials and the other of the heavy current water-cooled type for use with gases, which may also serve as the source of the hydrogen continuum. Intense local heating, which suffices to vaporise the material under investigation, is produced by a constriction in the positive column.

To show how liquid surfaces disintegrate in intense electric fields the British Electrical and Allied Industries Research Association employed a column of mercury in a narrow glass tube having a capillary orifice at its lower end, which is immersed in a semi-conducting liquid such as tricresylphosphate. A metal electrode is held at a short distance from the orifice so that the application of several thousand volts overcomes the effect of the surface tension of the mercury, which then passes rapidly through the orifice and forms a colloidal dispersion in the liquid. A sheet of dielectric, with a minute puncture (such as is produced by an electric breakdown) may be used in place of the capillary orifice to separate the liquids. A similar action occurs with other conducting liquids which are immiscible with the liquid medium.

A thyratron chronograph, employed by the Ballistics Section of the Research Department at Woolwich Arsenal, measures the time interval between two successive electric contacts by counting the number of oscillations of a fixed-frequency oscillator made during the interval. The apparatus has been designed to measure velocities of projectiles, the contacts being made by the bullet or shell on suitable metallic foil screens. The oscillator is crystal-controlled, with a frequency of 12,000 c.p.s. The counter is of a modified Wynn-Williams "scale-of-two" type, with seven thyratron-pairs. A neon indicator lamp is fitted to each pair, and the combination of these, with the reading of an electro-mechanical counter which forms the final stage, allows direct reading, from suitably constructed tables, either of the time interval or of the projectile velocity.

Mr. J. E. Barnard's simplified method of employing ultra-violet light for microscopy avoids the need for somewhat elaborate electrical apparatus to produce a high-voltage spark of sufficient intensity by using a mercury-vapour discharge lamp, as made by the Thermal Syndicate, Ltd. A large part of the ultra-violet energy produced by this lamp is confined to one line with a wave-length of 253μ, which is particularly useful in investigations with fresh biological material, especially when the presence of a virus is suspected.

A stereo comparator developed by the research officer to the Air Survey Committee (Ordnance Survey) and manufactured by the Cambridge Instrument Co., Ltd., enables accurate co-ordinate measurements to be made upon a pair of air photographs. Dr. A. Schott's apparatus for graphically representing gaseous exchange in air exhaled by a human being combines the katharometer and absorbent principles, with hot wire measuring elements. The recorder consists of three galvanometers and a continuous paper camera. Among Sir Robert Hadfield's metallurgical exhibits were representations of reversible magnetic changes at temperatures below atmospheric in a normally non-magnetic steel.

The Air Ministry displayed equipment for measuring the detonation in high duty aero-engines. An element is screwed into the engine cylinder like a sparking plug; it is uncooled and contains a dual piezo-electric quartz system which responds to pressure but not to vibration. Detonation is a transient involving much higher frequencies than those making up the normal pressure cycle, and thus a simple filter circuit in the meter will separate the detonation transient from the mixed signal delivered by the detonation unit. Use is made of a gas-discharge triode to measure the voltage representing the amplitude of the detonation transient.

Street-lighting Investigations

The General Electric Co., Ltd., demonstrated how the appearance of lighted streets can be investigated by projecting an artificial installation of two lantern slides on to a screen by two separate projection lanterns, each slide showing a photograph, made by the standard representation process, of a single light source and of its associated bright area on the road. By moving one projection lantern the apparent relative positions of the light sources can be varied at will, and the position found at which the resultant appearance of the road is just tolerably patchy.

The result obtained in this way can be recorded by the method of photographic photometry. With two slides of a complete installation superimposed, one showing a uniform result and the other an undesirably patchy result, by dimming the lanterns alternately the resultant appearance can be varied between the limits set by the two slides, and the tolerable "patchiness" found and recorded as before.

The G.E.C. method of finding the actual electron distribution in cathode-ray tubes and size of the spot consists in causing the spot to oscillate sinusoidally across a slit, narrow compared with the spot width, behind which is placed a Faraday cylinder. The unidirectional current impulses into the latter, are fed into a one-stage amplifier whose output feeds a second cathode-ray tube with a sinusoidal time base. The trace on this tube is the actual electron distribution in the spot, across a diameter at right-angles to the slit. A second slit, placed at right-angles to the first one, enables the distribution across a perpendicular diameter to be ascertained. The variation in distribution with variation in the chief parameters of the tube can be easily followed.

Electric and Musical Industries, Ltd., demonstrated the storage principle of the "Emitron" camera employed for television.

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Horizontal Discharge Lamps

In the article on "Lantern Characteristics" published in the ELECTRICAL REVIEW of May 20th I attributed to the self-running 400-W horizontal high-pressure mercury-vapour lamp a total output of 16,000 lumens. I understand that since March, when the article was written, the initial output has been standardised finally at 16,400 lumens, and that this figure was, in fact, adopted after the article had gone to press.

The comparison between this lamp and the standard high efficiency "Mercra" lamp operating with magnetic control is then as follows. The control produces 1,600 lumens for a power consumption of 5 W, an efficiency of about 320 lumens per watt. This output is about equivalent to that of 125 W in filament lamps, and, of course, the cost of replacing these would pay for the control in a comparatively short time. There appears to be little likelihood of further change in the relative efficiency of the two lamps operating horizontally, because the magnetic control realises the full output of the high-efficiency lamp by keeping the arc control in the lamp.

Rugby, *May 21st.* R. MAXTED.

Street-lighting Considerations

For some time recently there has been much discussion on the subject of street lighting, both in your columns and in the electrical Press generally, and an important, if not the principal, object appears to be the reduction of street accidents by means of better lighting. I would suggest, however, that no amount of improvement in street lighting is likely to make a very great difference to the number of accidents that occur in the streets, because those which occur after dark are mainly attributable to general fatigue and nerve strain resulting from the day's work, intensified by the stress and complexity of modern life.

Most pedestrians are more or less tired and often preoccupied with business worries or those economic difficulties which afflict so many of us in all walks of life, and are consequently less alert than in the morning. The same applies to drivers of private cars, while most drivers of buses, taxis and commercial vehicles have already undergone the strain of coping with modern traffic conditions throughout a long day and this strain is increased by the congestion due to the rush for home.

Accidents are most frequent at the evening rush hour even during summer time under the best possible daylight conditions, hence we cannot expect that improved artificial lighting will make much difference to the accident rate. Nevertheless, we ought certainly to make every possible effort to light our streets more effectively and intelligently, and I must say I am disappointed at the lack of enterprise and imagination hitherto evinced by those professing to deal with the subject.

The common assumption that good visibility is best ensured by means of a bright background, against which objects will appear in silhouette, with maximum contrast, presupposes the use of direct lighting. But in daylight we can see every detail perfectly without any silhouetting even when objects are almost the same colour as the background, owing to the fact that every object is evenly illuminated from all sides. It is already well recognised in connection with indoor lighting that the ideal for good general visibility and eye comfort is an evenly distributed, well-diffused indirect lighting such as we get in daylight. Obviously the same standards of visibility are equally or even more desirable for street lighting than for indoor lighting in view of the much greater dangers to life and limb in the streets.

Surely, therefore, it cannot be impossible or even very difficult to devise methods of producing an even, well diffused indirect form of street lighting which would give a standard of visibility much nearer to that of daylight than is possible with the present methods. G. V. DOWNER.

London, W.C.2, *May 21st.*

The Debt Burden

Judged by the standard of equity laid down by Mr. Foden in his article on "Municipal Electricity Debt Redemption" in your issue of May 13th that each generation should pay its own way and not hand on its debts to posterity, the present system is all wrong. The greatest financial difficulty of all businesses is the load of debt they are saddled with and every year the national and municipal debt increases

Yet the principle of financial rectitude on which Mr. Foden depends, and with which he expresses every satisfaction, has had this for its result. He assures us there is no way of escape. It would appear of paramount importance, therefore, for engineers to make a way of escape from a position which is becoming intolerable. A. M. W. (Grad. I.E.E.).

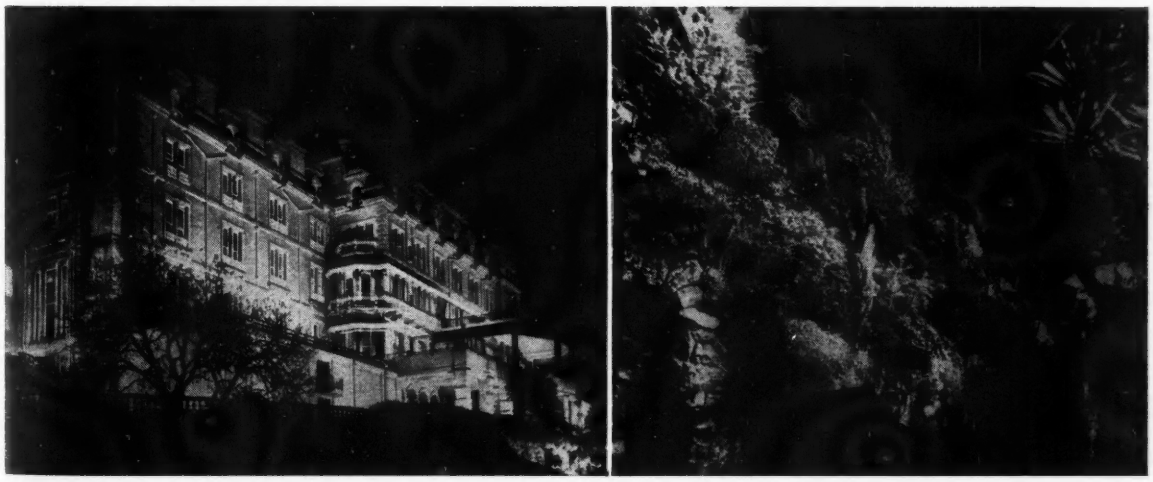
May 16th.

Distinguishing the Earth Wire

Regarding Mr. F. E. Butcher's letter in your last issue advocating a distinctive colour for the earthing conductor of three-core flexibles, I should like to add a word of warning. While heartily agreeing with Mr. Butcher's suggestion to use green for the earthing colour, I note that he says that this is standardised in the United States. In my experience, however, many American appliances (particularly refrigerators) are fitted with flexibles where the red conductor is connected to the case or housing. Black now seems to be the standard colour for the neutral, though I have in the past seen appliances where this colour has indicated the earth wire.

However, the answer to this question of confusion is simple enough. It is to always examine the internal connections of any appliance before fitting a three-pin plug—always excepting new appliances bearing the makers' label indicating the earthing conductor. In most cases this simply means removing a couple of screws or nuts, but in such cases as hair-dryers, where it is not quite so easy to get at the connections, a simple continuity tester will obviate dismantling the appliance.

A more serious, and not so easily detected, fault is the wrong connection of switch-sockets, so that the switch breaks the neutral instead of the live conductor. This is particularly dangerous where modern reflector fires are concerned, as the spring connections to the rod elements often protrude an inch



B.T.H. lighting at Torquay: Left: The Imperial Hotel illuminated by means of gasfilled lamps in "Mazdalux" projectors. Right: Combined gasfilled and discharge lamp lighting at the Rock Walk

or two into the reflector with practically no protection. This means that a person dusting the reflector, with the wall switch in the "off" position, could receive a nasty shock between element or element connection and case.

While it is admitted that in some cases the wireman is to blame for a wrong connection at the skirting plug or fuse board, the danger could be entirely avoided if supply authorities instructed their representatives to apply a simple "test-lamp" test to all sockets when connecting an installation. Indeed, I have come across cases where the contractor had used wires of the same colour for his meter loops, and the supply authority had connected the whole installation wrongly, making all the switches on the neutral pole. Of course, red and black wire should have been provided, but, after all, it is only a few minutes' work to find the correct polarity before permanently connecting the meter.

In the opinion of many experienced persons, earthed appliances bring into the home a new danger, which was not present in the days of unearthed radiators, etc. However, leaving this controversial subject to the experts, the fact remains that where three-core flexibles are used our slogan should be "Safety First." JOHN BLAND.

Edgware, *May 21st.*

Motors and the Factory Act

I consider Mr. Lawton has done motor users a great service by his letter in your issue of May 20th. His letter will clear the air for many users and owners of old but perfectly serviceable, and in many ways sturdier, types of machines—most of which I find are capable of withstanding more abuse and worse operating conditions than most of the cheap mass produced jobs of to-day.

Incidentally—why this positive fetish for ball bearings? In the cheaper motors they are merely forced on to the shafts with no locking nuts of any description; improperly protected against dirt, they soon get noisy. A well-constructed two-ring oiler is silent and, in my humble opinion, gives better service.

Bracknell, Berks, *May 23rd.* V. BURGOYNE.

The Design of Electric Cookers

In reply to "All-Electric's" letter decrying my criticism of Mrs. Rayner's proposed new design of cooker, it seems to me that when electric stoves are completely mass-produced standard articles, and therefore very cheap, then will be the time to start gradually adding refinements. The enormous scale of production will enable improved and additional fittings to be added at very little extra cost.

In my opinion, there is no doubt that to add the refinements put forward by Mrs. Rayner, would, by adding to the cost, decrease the output of cookers. And this would not only affect the progress of conversion to electric cooking, but would also slow up the present satisfactory rate of increase of kWh sold for this purpose. BERYL O. WATSON.

Oxted, Surrey, *May 23rd.*

Regulations for Mines and Quarries

Draft of new requirements issued

A DRAFT of the General Regulations for Metalliferous Mines that are to some into operation on July 1st for new work, three years later for existing approved installations below ground and seven years later for those above ground has been issued as M.D. Circ. No. 108 (Stationery Office, 10d.). The document comprises six parts of which Part V (ten pages or one-quarter of the whole) relates to electrical matters.

Among the new requirements are two which stipulate that apparatus and lines installed after the date named shall be of a standard not lower than those of the appropriate B.S. Specifications (if any) and that permanent overhead lines shall comply with the Regulations of the Electricity Commissioners.

Outdoor sub-stations (unless the apparatus is enclosed in an earthed metal casing and connected to the system by metal-protected lines) are to be fenced round to a height of 8 ft. or otherwise guarded from unauthorised access.

Conductors—Installation and Protection

Conductors not so placed as to prevent danger must be insulated. For voltages above 250 V d.c., or 125 V a.c. (except in the case of flexible cables used with portable apparatus or single-conductor cables having a continuous metal sheath and guarded to prevent danger) conductors must be protected throughout by a metallic sheath having a conductance not less than half that of the largest conductor.

Flexible cables for portable apparatus are required to be multi-core and to include an earthing conductor with a cross-sectional area and conductance not less than half that of the largest live conductor. At voltages exceeding 250 V d.c., or 125 V a.c., an enclosing metallic covering or flexible metallic screen is necessary, with a minimum size of 0.022 sq. in.

Enclosing structures of metal that can be touched while the circuit is alive (except those for portable apparatus at not more than 250 V d.c., or 125 V a.c.) shall be connected to one or more earthplates by a conductor which may not be less than 0.022 sq. in, unless it forms one core of the multi-core cable or is part of an overhead system.

The outer conductor of an earthed concentric system, the rails of a traction system (when used as one pole) and the secondary of a single-phase transformer used for indicating instruments or switchgear accessories shall be connected with earth. The neutral point of an a.c. system shall be earthed except that one pole of a three-phase, three-wire system derived from the secondary winding of a three-phase transformer and used for indicating instruments or switchgear accessories can be earthed instead of the neutral.

A system may be earthed at one point only, except in the case of an earthed concentric system or of a traction system with the rails connected to one pole. While the use of an automatic circuit-breaker in any earth connections is forbidden, a non-automatic switch or link is permissible for testing or where energy is obtained from two or more generators or transformers in parallel to permit the neutral of one only to be earthed. A current-limiting device may be included in the earth connection. Earth plates for the system and for metallic structures are to be interconnected unless the resistance between them is not more than two ohms.

Leakage Current

The leakage current of any circuit must not exceed one ten-thousandth part of the rated current. An a.c. circuit in which the voltage exceeds 125 V for portable apparatus or 650 V for other apparatus shall be automatically isolated when the leakage current exceeds 15 per cent. of the rated current.

No portable hand-lamp shall be supplied at more than 250 V d.c., or 25 V a.c. No portable apparatus shall be supplied at more than 250 V d.c., or 125 V a.c., where the continuous rated output of the motor does not exceed 5 h.p. or the input of other applications does not exceed 5 kVA. The lower-voltage system of a transformer shall be earthed or otherwise protected from becoming charged above its normal voltage.

Means must be provided at the surface to cut off supply to the installation below ground and while the latter is alive an authorised person must be within easy reach, in telephonic communication with the mine. When necessary to prevent danger, means must also be available at the surface to protect the installation below ground from abnormal voltage due to atmospheric electricity.

Where there is a risk of igniting gas, all apparatus (including telephones and signals) shall be of a type approved by the Board of Trade. Consent of the latter is required to the use of electric locomotives for haulage below ground. A scale plan showing the positions of all apparatus and cables, and distinguishing those installed after the coming into force of the Regulations, has to be kept at the mine, and an annual return of all electrical plant must be made.

Electrical Work and Inspection

Only a skilled and experienced electrician may undertake work where technical knowledge is needed to avoid danger and only an authorised person may undertake any electrical work. Instructions for the treatment of electric shock shall be exhibited where the voltage exceeds 250 V d.c. or 125 V a.c.

External examination shall be made of apparatus or lines at least once in seven days. Apparatus, whether new or reinstalled in a new position, must, before use, be tested for insulation resistance and conductance of earth conductors and the results recorded. Similar tests must be made not less frequently than once in six months for all parts of an installation.

Systems used exclusively for signalling or telephones and supplied at not more than 50 V from a battery or for telephones from hand-operated magnetos or other systems working at not more than 25 V are exempt from many of the regulations. Revised General Regulations have also been issued in draft dealing with the use of electricity at quarries, M.D. Circ. 109 (Stationery Office, 3d.) which also come into force on July 1st. The wording of these is similar to the Mines Code, but provisions not applicable to quarries are omitted.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

E.D.A. Activities

The E.D.A. carnival car is already proving very popular, and a number of dates have been booked. The June Sales and Publicity Programme of the Association gives a list of bookings. The Association has also prepared a variety of publicity material to link up with the national electric refrigeration campaign, including books and folders, local advertising stereos, posters, window displays, and window display supplementaries. Sales' aids in the domestic electrification campaign are also available and the programme includes illustrations of water heating and cooker window displays, an "Electric Home Book," and folders for inclusion with accounts, &c. Stereos and posters can also be obtained for linking up with the National Press campaign. The Association has produced a new book on electric street lighting, dealing with the Final Report of the Ministry of Transport Department Committee on Street Lighting, and also a booklet especially produced to encourage the demand for electricity among tenants of small and medium-sized houses not yet connected to the mains. A useful publicity medium are overprinted bowls scoring cards.

Contractors' Conference

At this year's E.C.A. Conference (Hastings, June 22nd-24th) five papers are to be read. They are as follows:—"What Insurance is desirable for Electrical Contractors, and its Cost?" by Mr. E. A. Reynolds; "How to avoid Fittings and Apparatus being excluded from the Contractor's Contract," by Mr. W. Cross; "The Application of the Electric Discharge Lamp to Interior Lighting" (with demonstrations), by Mr. W. J. Jones; "Holidays with Pay in the Electrical Industry—Two Years' Experience," by Mr. A. G. Bruty; and "The Technique and Morality of Advertising," by Mr. W. I. Jones.

Registered Electrical Contractors

Applications for registration from the following were accepted by the Executive Committee of the National Register of Electrical Installation Contractors at its last meeting:—

Brand, A., Plymouth.
Mainwaring, W., Oxenhope, near Keighley.
Phillips, E. G., Birmingham, 4.
District Electric, Ltd., Finchley, N.3.
Evans & Shea Ltd., Barking.
Sneath, J. G., Ltd., Limehouse, E.14.

At the same meeting one application was withdrawn and one was declined.

Electrical Equipment for Hospitals

All types of electrical equipment for hospital and medical use can be seen in a new section which the directors of the Building Centre have just opened at 158, New Bond Street, London. Two model operating rooms demonstrate the high intensity illumination achieved by the Holophane "Controlens" system and a special G.E.C. fitting and supplementary lighting by means of G.V.D. indirect units and various types of fittings made by the Amplilux Lighting and Illumination Co., Ltd., and Technical Lights and Equipment, Ltd., is also to be seen. For viewing X-ray plates a Frederick Thomas cabinet is installed. Special features of a ward unit include Hanovia artificial sun-ray lamps; Thermega electrically heated blankets and cradles; ward indicators; bed-head fittings, comprising lamps and points for electro-medical apparatus, radio and telephone; and various types of lighting fittings (G.E.C., Troughton & Young, Holophane, and Hailwood & Ackroyd), among which are night-light units and telescopic inspection lamps. Among sterilising equipment we noticed the new Maw "Sterotherm" which operates by means of electrically heated hot air. This apparatus has a maximum loading of 650 W and is thermostatically controlled. The manufacturers, S. Maw, Son & Sons, Ltd., are also experimenting with a sterilising device employing diathermy as the agent. A special display organised by the Electro-Medical Trade Association, Ltd., indicates the latest advances made in equipment for artificial sunlight and infra-red ray treatment, shortwave therapy and surgical diathermy.

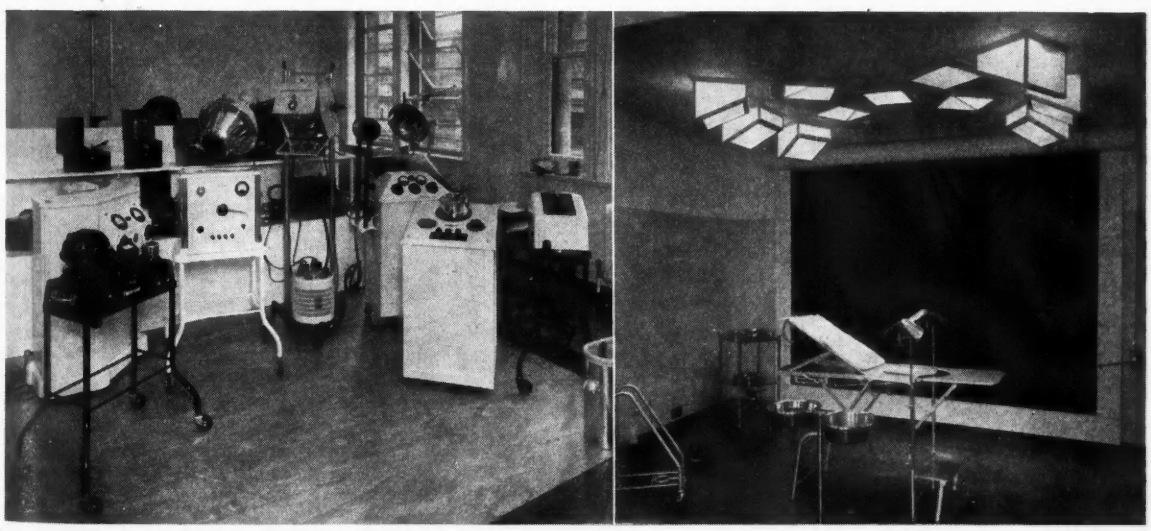
Selling Invisible Light

The British Thomson-Houston Co., Ltd., has recently installed a display in its Crown House, Aldwych, window which

Have you seen the new decorative lighting effects with invisible rays?
LOOK HERE!
Have you seen the new decorative lighting effects with invisible rays?
LOOK HERE!
THE MERCRA LAMP WITH ULTRA-VIOLET FILTER BULB

A "Mercra" ultra-violet filter lamp display at Crown House

is attracting a good deal of interest. This display features the new "Mercra" lamp with ultra-violet filter bulb. A "rough cast" proscenium covers most of the interior surface of the window, and behind this there are three compartments. The central compartment is open to the street and in it there is displayed an unlighted "Mercra" ultra-violet lamp on a draped pedestal, together with showcards describing the many applications of this lamp for decorative, scientific and industrial use. The two side compartments are completely enclosed and have only "viewing slots" cut out of the proscenium at eye-level. In each of these compartments there is a decorative display treated with fluorescent paint, and in the foreground an ultra-violet lamp. In one compartment there is a vase of artificial flowers placed in front of a draped curtain. In the other there is a miniature scene showing a small lake with bulrushes and other water plants, and at the side a built-up rockery. Butterflies posed in flight are also to be seen. Parts of these two features have been treated with special fluorescent paint which, when subjected to invisible ultra-violet rays, produces visible light. The ordinary tungsten lighting in each of these compartments is controlled by a rotary flasher. With the ordinary lighting the display is clearly and adequately



[Elec. Rev. photos.

A display of electro-medical apparatus at the new hospital and medical section at the Building Centre and (right) one of the model operating theatres equipped with Holophane "Controlens" lighting

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illuminated. When, however, the tungsten lamps are switched off and the displays are lighted only by the ultra-violet lamps, there is a complete change of scene and colour. Only the features treated with fluorescent paint are visible, everything else being in complete darkness.

Two Carnival Tableaux

On May 14th the Stoneclough and District Silver Jubilee was held, and attracted a large number of entries. The illustration on the right shows the display by the Lancashire Electric Power Co., which was awarded second prize. As our picture reveals, the chief feature of the display was a scene showing the company's Kearsley power station, while a variety of domestic appliances completed the tableau. The other illustration shows the E.D.A. processional car which was entered by the Birmingham Corporation Electric Supply Department in the annual carnival procession at Solihull on May 7th. The car attracted considerable attention. The representative of the Department who accompanied it was dressed as the "Electric Imp."

The E.D.A. processional car entered for the Solihull carnival by the Birmingham Electric Supply Department and (right) the prizewinning tableau by the Lancashire Electric Power Co. at Stoneclough

Electrical Contracting at Colwyn Bay

Electrical contractors at Colwyn Bay have been in negotiation with the Council Electricity Committee with regard to the sale of electrical apparatus and the wiring of premises. After a deputation of contractors had stated their case the Lighting Committee decided not to approve the heads of agreement as recommended by a sub-committee and also that the agreement with the electrical contractors, which expired in December last, should be renewed for a period of three years on the understanding that the hire-purchase sales of the contractors should not be financed by the Council. At a subsequent meeting of the Committee it was decided that provision should be made in the proposed agreement with the contractors for the Council to exercise its right to sell electrical appliances for cash. Under the new agreement the Council will exercise its right to sell domestic electrical apparatus for cash or on hire-purchase terms, but will continue to forgo its right to wire premises. The contractors will finance their own hire-purchase sales and agreed discounts will be allowed to either party for business introduced by the other. The contractors will each provide a showroom.

Employment in April

There was little change in employment in the engineering industry in April, and although there was a slight decline in electrical engineering, that section was still very good. According to the *Ministry of Labour Gazette* the number of unemployed in the engineering industry was 77,009, a decrease of 613, the percentage being 6.6, as compared with 5 per cent. in April, 1937. In the electrical engineering industry the number out of work totalled 5,851, or 5.1 per cent., an increase of 0.3 per cent., as compared with March, and of 2 per cent., as compared with April, 1937. The unemployed in the electrical wiring and contracting industry decreased slightly to 4,362 or 10.6 per cent. (10.7 per cent. in March and 9.6 per cent. in April, 1937). In the cables, apparatus, lamps, &c., group the unemployed numbered 16,589, the percentage rising from 9.2 to 9.3 (5.1 per cent. in April, 1937).

Works Extension

The works of British Timken, Ltd., at Aston, Birmingham, are being extended. This is the third extension in four years, and the new premises will occupy a floor space of 34,280 sq. ft.

Orders Recently Booked

The latest of the new South African mail boats, the *Capetown Castle*, which is now on its maiden voyage, is the fifth Union Castle liner to be equipped with the "Harlandic-Synclock" time system. This system gives the true "sun's time" at all longitudes. The Union Castle Steamship Co. has been so satisfied with the operation of this clock system on the *Stirling Castle*, the *Athlone Castle*, the *Dunvegan Castle* and the *Dunnottar Castle* that it has decided to install it in two further vessels, the *Durban Castle* and the *Pretoria Castle*, now under construction.

Siemens Brothers & Co., Ltd., have received instructions from the British Tanker Co., Ltd., to equip nine tankers now under construction with complete ½-kW c.w./i.c.w. wireless stations, with auxiliary short-wave transmitters, direction finders and auto-alarms. These units are interconnected as required by law and also to give centralised control with full safeguarding of all circuits. This contract follows on that for the six tankers (last year's programme) similarly equipped.

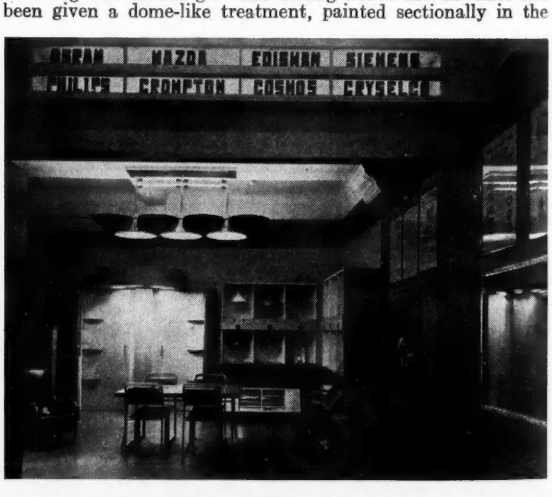
Among contracts for bus bodies recently received by the English Electric Company are a repeat order for eight 36-seater single-deck all-metal bus bodies for Dundee Corporation, and six 56-seater double-deck all-metal bus bodies for Youngs' Bus Services, Ltd. Among contracts recently completed is a repeat order for six double-deck buses of the company's latest standard design of reinforced composite construction, with a seating capacity of fifty-two passengers, for Barrow-in-Furness Corporation.

Among recent orders received by Sunbeam Commercial Vehicles, Ltd., for their 12/15 cwt. electric vehicles are further repeat orders from Selfridge & Co., Ltd., and Wm. Whiteley, Ltd. The Birmingham Corporation Electric Supply Department has also recently taken delivery of a Sunbeam electric vehicle with a specially designed van body for the delivery of electric cookers and other appliances.

Britannia stationary lead-acid batteries have been installed for emergency lighting in the Shell-Mex and Beardmore-Colville pavilions at the Empire Exhibition. Britannia Batteries, Ltd., has also recently received orders for several batteries to be erected in the Western Isles, at Cornaigmore School, Tiree, Bowmore School, Islay, and at Castle Bay, Barra.

The Scottish Lighting Service Bureau

The E.L.M.A. Lighting Service Bureau, which has been in existence in Glasgow for seven years, has recently been redecorated under the direction of Mr. M. W. Hime, the district engineer in charge. The ceiling above the entrance has been given a dome-like treatment, painted sectionally in the colours of the spectrum, and is lighted by indirect fittings. The novel illuminated shelves which have attracted so much attention in the architectural room in London have been duplicated here in a slightly different form, while the many small demonstration cabinets each illustrating some pertinent light-



A section of the Scottish Lighting Service Bureau, Glasgow, which has recently been redecorated

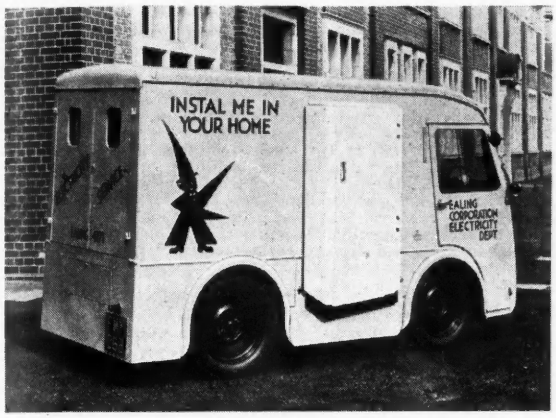
ing principle occupy another wall. The displays of architectural lamps, illuminated doors, colour lighting, industrial demonstrations, and street-lighting equipment are carried out in the Bureau style. There are, however, two systems of louvre lighting designed by Mr. Hime which are worthy of particular notice, as they enable over 100 ft.-candles of illumination to be obtained with an absence of glare. Visitors to the Empire Exhibition would do well to visit this permanent exhibition, which will give them an insight to the lighting development work which is constantly carried out by E.L.M.A. in various parts of the country.

"Northmet" Publicity

The North Metropolitan Electric Power Supply Co. has sent us a selection of its latest publicity material. This includes examples of advertisements which have been appearing in the local Press dealing with spring cleaning, electric water heating and refrigeration. The company has also issued a number of attractively produced folders, in colour, relating to electric refrigeration, setting out its hire-purchase terms, and also one drawing attention to electric kettles.

Refrigeration Propaganda

An unusual and effective method has been adopted by the Ealing Corporation Electricity Department to draw attention to domestic electrical appliances. As our picture shows, it has attached to one of its vans a model of a Westinghouse refrigerator. This is constructed of plywood, is finished in



A model of a refrigerator attached to an Ealing Corporation van

white, and is fixed to the van by means of four bolts. The arrangement is such that the refrigerator can be replaced by either a cooker or water heater according to the season of the year. The van itself is finished in an attractive shade of blue.

Prices of Materials

Henry Gardner & Co., Ltd., report, May 25th: Copper bars (best selected), sheet and rod, £70, £3 decrease. English pig lead, £16, 5s. decrease. Spelter, £12 11s. 3d., 2s. 6d. decrease. English block tin, £161 5s., £1 5s. decrease. Mercury, £13 10s., £1 10s. increase.

Frederick Smith & Co. report, May 25th: Electrolytic copper bars, £39 5s., £4 decrease. Ditto, ditto, wire rods, £43 15s., £4 decrease. Ditto, ditto, h.c. wire, 7⅞d., ⅛d. decrease. Silicium bronze wire, 8⅜d., ⅛d. decrease.

Edward Till & Co. report, May 25th: India-rubber, Para fine, no change.

The London Building Acts

"The London Building Acts 1930 and 1935" has just been published by Kelly's Directories, Ltd., at 10s. 6d. net. The last edition of this book was known as "The London Building Act, 1930," and was published in 1931. The new edition has become necessary owing to the enactment of the London Building Act (Amendment) Act, 1935, and to the introduction of the new by-laws made by the London County Council in December, 1937. The law relating to building in London has been greatly changed, and the changes have necessitated the scrapping of over one hundred pages appearing in previous editions of this publication. A number of sections from the Public Health (London) Act, 1936, which are important to those engaged in the building industry are included in the book as well as extracts from other new Acts, namely the Factories Act 1937 and the Restriction of Ribbon Development 1935, with the special London order made under it. The explanatory outline of London building legislation which is given, for the first time, at the beginning of the book, should prove of great use to the non-professional reader. The annotation of cases given in the footnotes have been carefully revised to conform with the law as it stood at the beginning of this year.

Social Events

The management of the Telephone & Radio Works of the General Electric Co., Ltd., at Coventry, recently gave a complimentary dinner to employés who have completed twenty-one years of service with the company. More than eighty guests were present, and jointly they represented 2,333 years of service. Among them were seven who joined the company last century, while the individual record for long service goes to a member of the staff who joined the G.E.C. in February, 1888. The dinner was followed by a short address by Sir William Noble, who presided.

The annual outing of Abell & Smith's Electrical Co., Ltd., was held recently, when a visit was paid to the Chelmsford works of Crompton Parkinson, Ltd. The party was accompanied by directors of the company and by Mr. D. E. Graham, manager of the Birmingham office of Crompton Parkinson, Ltd., and Mr. P. Redfern, of the lamp department. On arrival at Chelmsford the party was welcomed to lunch by Col. Hardie, general manager, and Mr. H. H. Spencer, manager of the London office. Escorted by guides the visitors inspected the various manufactures of the company, and after tea they travelled by coach to London, where they were left to their own devices, the return to Worcester being made at midnight.

E.D.A. (Newcastle) Carnival

As a result of the tenth E.D.A. carnival held in Newcastle on January 14th the sum of £121 has been paid to the Electrical Industries Benevolent Association. This is in excess of any previous year and brings the total profits from the ten carnivals to over £1,000.

Electricity Supply Workers' Wages

The workers' side of the Joint Industrial Council for the Electricity Supply Industry has applied for a national advance in wages of 2½d. an hour for all grades of employés. Both sides have agreed to the claim being referred direct to the Industrial Court for arbitration.

An Income-tax Guide

Jordan & Sons, Ltd., 116, Chancery Lane, W.C.2, have again issued their "Income Tax Guide" (6d.) in which changes effected by the 1938 Finance Act are fully covered. Useful examples of the operation of the Act are included.

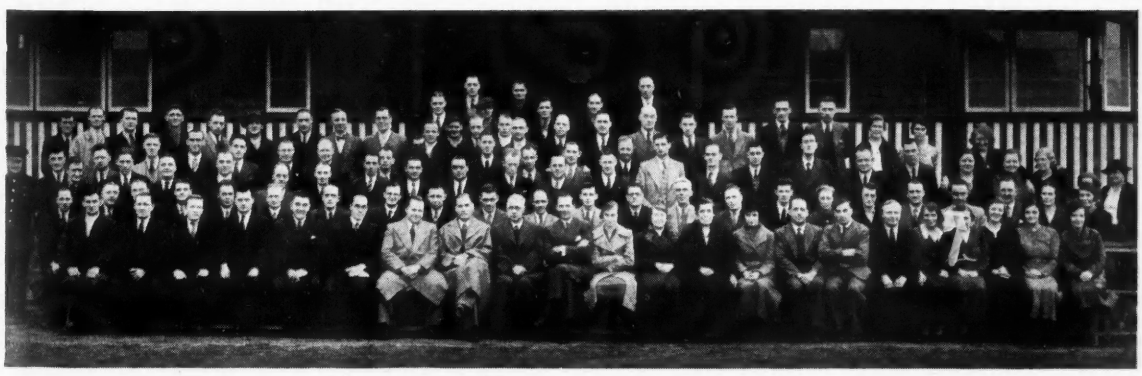
Trade Announcements

Ensign Lamps, Ltd., has opened a new depôt at West India House, Baldwin Street, Bristol. Mr. W. F. Boalch who has been the company's representative in the West of England for some time past, has been appointed manager.

B. Berger & Co., Ltd., electric light reflector manufacturers and designers, have removed to larger premises at 176, Albion Road, London, N.16 (telephone: Clissold 4775).

Wholesale Electrical Supplies, 38, Gresham Street, Belfast, have been appointed the Northern Ireland agents for Union Lamps.

For the greater convenience of their customers in Edinburgh and district, Callender's Cable & Construction Co., Ltd., will open on June 1st a new sales office and stores at 131, Rose Street, Edinburgh, 2. The new office will be under the charge



Members of the Midland Electric Manufacturing Co., Ltd., who have been awarded the company's gold watch for long service. In the front row are Mr. W. L. Barber (managing director), Mr. A. Wynn (general manager), and Mr. T. Birkett

of Mr. J. H. Dinwoodie. The address of Callender's contracts office, 18, Grosvenor Street, Edinburgh, 12, remains unchanged.

Power Station Visit

On May 7th 100 members of the English Electric (Stafford Works) Engineering Society paid a visit to the Battersea power station. The visit was made possible through the kindness of Sir Leonard Pearce, engineer-in-chief of the London Power Co., Ltd.

A Useful Trade Directory

"Kelly's Directory of Merchants, Manufacturers and Shippers of the World for 1938" has just been published. This book, as in the past, consists of two volumes, which together form a complete buyers' and sellers' guide for home and foreign trade. To take home trade first, the larger part of volume II deals with the British Isles and this section is, in fact, a general trade directory of the British Isles, covering the wholesale and manufacturing trades, classified both alphabetically and by trades. As such it is invaluable to firms interested in home trade only. The rest of volume II is devoted to the British Empire other than the British Isles, and here the names of agents, exporters, importers, wholesale merchants and manufacturers are arranged alphabetically by trades and towns under the various geographical divisions. Volume II thus covers the wholesale trade of the British Empire. In volume I will be found particulars for all the countries of the world, other than the British Empire, and the information in it is arranged similarly to that in the Dominion and Colonial section of volume II. Here the British exporter will find what he needs to know with regard to world markets and the firms overseas with whom he wishes to get into touch. That the present volume is up-to-date will be evident to anyone who refers to the German section, for there the recent events in Austria are recorded by the insertion of the Austrian section immediately after Germany. These two volumes occupy a unique position, as they contain information, which in its entirety, cannot be obtained from any other source. The price of the Directory is 64s.

New Catalogues and Lists

Siemens Electric Lamps & Supplies, Ltd., 38/39, Upper Thames Street, London, E.C.4.—Lists dealing with exhaust fans and table and ceiling fans.

Surrey Wholesale Electrical Co., Ltd., Church Path, North End, Croydon.—A 160-page illustrated catalogue of electrical equipment, including installation accessories, switchgear, fans, industrial lighting fittings and cables.

S.L.R. Electric, Ltd., 17, Hanover Square, London, W.1.—A well-illustrated art catalogue of lighting fittings.

Drake & Gorham Wholesale, Ltd., 77, Long Acre, London, W.C.2.—A catalogue of electric fans.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A leaflet illustrating G.E.C. flameproof apparatus.

M.K. Electric, Ltd., Wakefield Street, Edmonton, London, N.18.—A leaflet illustrating plugs to B.S.S. 546.

Herbert Morris, Ltd., Loughborough.—Details of Morris pulley blocks.

Measurement, Ltd., Terminal House, Lower Belgrave Street, London, S.W.1.—A booklet dealing with the "Actadis" ripple control system.

Renold & Coventry Chain Co., Ltd., Renold Works (P.O. Box No. 5), Didsbury, Manchester.—A booklet dealing with the application of chains to driving and conveying in the printing industry.

Veritys, Ltd., Aston, Birmingham.—A 115-page illustrated catalogue of electric fans, including sectional diagrams and a spare parts list.

Marshall Electrical Co., Ltd., Tottenham Street, London, W.1.—A net trade price list of "Meco" electrical accessories.

W. H. Sugden & Co., Ltd., Glenny Road, Barking.—A stock list of motors.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Pamphlets relating to bus-bar zone protection and induction type relays.

Bankruptcy Proceedings

W. H. McMillan, radio dealer, 21, Allport Lane, Bromborough.—Receiving order made May 13th on debtor's own petition. Public examination June 15th at the Court House, Birkenhead.

H. Denton, radio dealer, Canal Road, Crossflatts, Bingley.—Public examination July 5th at the County Court, Bradford.

O. Wales, electrical engineer, 82, Rusper Road, Horsham.—Public examination July 29th at the Court House, Brighton.

S. J. Miles, radio and electrical engineer, 134, Queen Victoria Road, Coventry.—Application for discharge to be heard on June 20th at the County Hall, Coventry.

Company Liquidations

Browning Wireless Manufacturers, Ltd.—Winding up voluntarily. Liquidator, Mr. F. N. Whittaker, 4, Marchmont Street, Russell Square, W.C.1.

Radio & Electrical Services (Beaminster), Ltd.—Meeting June 25th at 10, South Street, Bridport, to receive an account of the winding-up by the liquidator, Mr. M. W. Burrough.

Albion Electrical Services, Ltd.—Winding up voluntarily. Liquidator, Mr. V. H. F. Green, 17, Basinghall Street, E.C.

Cavendish Electric, Ltd.—Meetings June 21st at 55-56, Lincoln's Inn Fields, W.C., to receive an account of the winding up by the liquidator, Mr. G. H. Fletcher.

Hamilton Radio Co., Ltd.—Meeting June 17th at 13, Church Street, Preston, to receive an account of the winding-up by the liquidator, Mr. S. Thornton.

Private Arrangements

G. T. Webster, lately trading as General Wholesale Supplies at 1, Fratton Buildings, Goldsmith Avenue, Portsmouth, radio and electrical wholesaler.—The creditors met recently when the statement of affairs disclosed liabilities of £216, and in addition there were fully secured creditors for £99. The net assets were £78. The debtor attributed his present position to insufficient capital and small profits. The fully secured creditors were the bankers, who held a life policy of the surrender value of £130. It was decided that the debtor should be requested to execute a deed of assignment to Mr. W. C. Black, of Messrs. W. C. Black & Co., 17, King's Terrace, Southsea, as trustee.

J. F. Magoris, trading as "Magoris & Co.," 160, George Street, Hull, electrical engineer and contractor.—The creditors met recently at the offices of Morgan, Crumpton, Cappleman & Co., Paragon House, Paragon Street, Hull. A statement of affairs was submitted showing liabilities of £242. The net assets were £67, leaving a deficiency of £175. It was decided that the estate should be left in the hands of Mr. Morgan to realise the assets and distribute the proceeds *pro rata* among the creditors.

F. Arrowsmith, radio dealer, 34, Gt. Moor Street, Bolton, and at Bury, Accrington and Blackburn.—The creditors met recently when a statement of affairs which had been prepared by Harry L. Price & Co., I.A., 47, Mosley Street, Manchester, was submitted which showed ranking liabilities of £2,293. and in addition there were fully secured creditors for £1,471. The net assets were £1,226, leaving a deficiency of £1,067. The debtor attributed his present position to lack of liquid capital, lack of credit facilities and losses on hire-purchase business. The creditors were in favour of administering the estate under a deed of assignment, but one creditor intimated that he would not agree to the deed, and it was stated that in order to protect the assets the debtor would file his own petition.

Flameproof Electrical Equipment

THE quarterly schedule of mining and industrial equipment for which certificates of flameproof enclosure were issued by the Mines Department during the three months ended March 31st, 1938, excludes modifications to apparatus previously certified. The list shows whether the gear has been tested in (1) methane, (2) petroleum and acetone vapours, (3) coke-oven and coal gases, and includes the following:—

British Jeffrey-Diamond, Ltd., (1) air-break reversing drum switch, d.c. 50 A up to 650 V with alternative connections; 60-h.p. coal cutter, three-phase up to 650 V, comprising s.c. motor with haulage-end and associated terminal compartment, mechanically interlocked plug connector and alternative starters.

British Thomson-Houston Co., Ltd., (2) slip-ring motors, three-phase up to 650 V of various sizes; (1 and 2) small and medium box girder slip-ring units.

Charles Crofton & Co. (Engineers), Ltd., (1) "Victor" plug and socket cable coupler, 30 A up to 650 V with four pins for pilot interlocking only.

Electric Construction Co., Ltd., (1 and 2) oil-immersed transformer unit, single-phase 0.25 1.5-kVA, 600/110-V with incoming and outgoing "Wigan" fuse-switches.

Electrical Power Engineering Co. (B'ham), Ltd., (1) small d.c. motors of differing sizes 110/530 V and (1 and 2) d.c. motors of 8.25-22.5 h.p. at 100/600 V; (1) small s.c. motors, two- and three-phase 25/100 cycles up to 600 V.

Everett, Edgcumbe & Co., Ltd. (1 and 2) moving-coil and moving-iron ammeters up to 100 A and voltmeters up to 750 V with alternative terminal and mounting arrangements; also a.c. and d.c. leakage indicators.

Wilfrid Francis & Co., Ltd., (1) air-break distribution unit for 600 A at 400/650 V three-phase, with three-pole hand breaker, isolator and protective features.

General Electric Co., Ltd., (1 and 2) three-phase s.c. motors for 440 V from 100 h.p. downward in numerous sizes.

Hardypick, Ltd. (1) Type "Two drill" gate-end transformer and switch box and reversible plug and socket cable coupler (15 A, 125 V).

Heyes & Co., Ltd. (1 and 2) Well glass lighting fittings for 100-W lamps.

Klaxon, Ltd. (2) Type H.F.8 signal for 6/250-V a.c. or d.c.

Laurence, Scott & Electromotors, Ltd. (1 and 2) Motors rated at from 45 to 125 h.p. of s.c. and slip-ring types, d.c. motors of 13-27.5 h.p., d.c. generators rated at 9.7-20 kW and small d.c. motors and generators of 1.5-3.2 h.p. and 1.1-2.35 kW respectively.

M. & C. Switchgear, Ltd. (1) 120 h.p. combined air-break controller and resistance unit. (1 and 2) Air-break 50-A star-delta starter.

Mather & Platt, Ltd. (1 and 2) Flame-ventilated motors up to 550 h.p. of slip-ring and a.c. types.

Mavor & Coulson, Ltd. (1) Air-break d.c. reversing starter for d.c., 10 and 15 h.p., also 50-h.p. coalcutter unit.

Metropolitan-Vickers Elecl. Co., Ltd. (1 and 2) Auto-transformer starters rated at from 60 to 250 A, 20 h.p air-break contactor starters, also (1) signalling transformer unit for 220/650 V.

Nalder Bros. & Thompson, Ltd. (2) Relay with reset device.

W. & H. Nelson, Ltd. (1) Air-break circuit-breaker rated at 30/100 A at 600 V.

Bruce Peebles & Co., Ltd. (1 and 2) Slip-ring unit (type C) rated at 200 A, 550 V.

Tuscan Engineering Co. (2) D.c. petrol pump motor and switch for 50/550 V.

Uskside Engineering Co., Ltd. (1) A 15-in. d.c. coalcutter unit and rated at 30-40 h.p., 200/600 V.

Electricity Supply

Lighting, Domestic, Power

Bathgate.—STREET LIGHTING.—The local gas company and the Scottish Midlands Electricity Supply, Ltd., are being invited by the Town Council to tender for street lighting.

Bishop Auckland.—OVERHEAD LINES.—Permission has been granted by the Durham County Council for the North-Eastern Electric Supply Co., Ltd., to erect lines over part of Bishop Auckland Estate and Greenfield Farm, Etherley.

Brighton.—SOUTHWICK POWER STATION.—The Electricity Committee reports that at the request of the Central Electricity Board a consulting engineer is being engaged to prepare a report upon the circulating water requirements in connection with a possible extension of the Southwick power station.

SUPPLY TO WATERWORKS.—The Electricity Committee is to extend the plant at the Islingwood Road sub-station at a cost of £1,460 in connection with the supply to the Waterworks Department.

Briston.—ELECTRIC STREET LIGHTING.—The Parish Council has decided to enter into an agreement with the East Anglian Electric Supply Co. for the erection and maintenance of eleven lamps.

Chester.—BETTER LIGHTING.—The Electricity Committee is to improve the lighting in various roads at a cost of £832.

Clitheroe.—RURAL SUPPLIES.—Applications for a supply to Mitchell's Farm, Waddington, and Higher Kempstone Farm, Chatburn, have been agreed to by the Electricity Committee.

Clydebank.—ELECTRIC STREET LIGHTING.—Application is to be made by Town Council to borrow £18,700 for street lighting improvements. The remainder of the gas lighting is to be superseded by electricity.

Darlington.—WIRING COUNCIL HOUSES.—Electrical installations are to be provided in eighty-eight of the Council's houses at a cost of £400.

Daventry.—PUMPING PLANT FOR B.B.C. WATER SUPPLY.—The borough surveyor has recently reported to the Council that the arrangements for pumping water to the B.B.C. broadcasting station at Daventry are unsatisfactory, and suitable electrical pumping plant is to be installed.

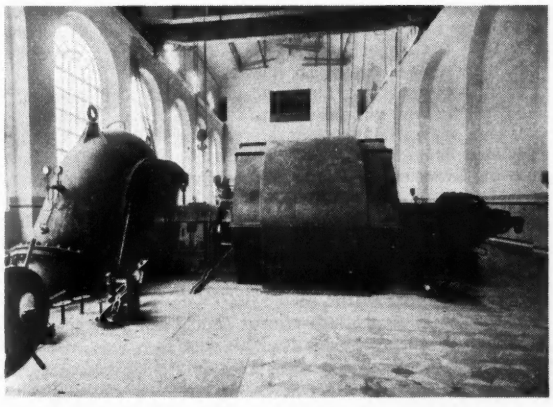
Debenham.—STREET LIGHTING.—The Parish Council has accepted the tender of the East Anglian Electric Supply Co. for lighting the village streets.

Dorchester.—EXTENSIONS.—The Rural District Council has been informed by the Wessex Electricity Company that negotiations are now in progress to supply electricity to the Herrison Estate and Forston, in the parish of Charminster, and to the parishes of Godmanstone and Nether Cerne.

Dundee.—CAROLINA PORT EXTENSIONS.—When representatives of Dundee Corporation recently met officials of the Central Electricity Board, it was indicated to them that the Board was anxious that the £500,000 development at the Carolina Port power station should be completed as quickly as possible. At a recent meeting of the Electricity Committee it was explained that the Corporation had borrowing powers only to the extent of £10,000, but the Central Board had stated that it must go ahead with the extension and the Board was prepared to accept full responsibility for excess expenditure.

Fleetwood.—LIGHTING IMPROVEMENTS.—The Council is seeking a loan of £12,500 for improved street lighting by electricity.

France.—NEW HYDRO-ELECTRIC PLANT.—New hydro-electric plant with a capacity of 55 million kWh per year has recently been completed on the Arn River at Vintrou. The river,



Hydro-electric power plant at Vintrou, France

according to studies carried on over a period of sixty years, has an annual flow of 23,760 million gallons at the point chosen for the construction of the dam at the Metairie of Sts. Peyres, where it is particularly narrow, running in a deep granite gorge. The rectilinear dam is 590 ft. long and 197 ft. high at the centre, so raising the maximum height of water in the reservoir to 2,197 ft. above sea level. It is built completely of concrete. There are three horizontal shaft turbines of 15,000 h.p. each, and one of 1,500 h.p. Each of the larger turbines drives a 14,700 kVA generator, while the smaller one is of 1,475 kVA. The turbines are designed to work under a maximum theoretical head of 882 ft. and pass a maximum of 3,300 gal. per second. The plant is intended for rapid connection to the network to carry heavy peaks and to provide a standby when other plants of the network are operating at reduced level.

Ipswich.—PROPOSED NEW POWER STATION.—The Central Electricity Board has instructed the Corporation to prepare a preliminary report regarding the possibility of a large power station being erected on a site near the River Orwell between Cliff Quay and the sewage outfall works. This work is now in hand by Messrs. Merz and McLellan, with whom Mr. Hampton E. Blackiston, the chief engineer and manager of the Corporation's Electric Supply and Transport Departments, is acting as joint consulting engineer. In the accompanying aerial photograph the site of the station is virtually the four ploughed fields and the darker one on the right, only part of which is shown.

The site of the proposed power station of the Ipswich Corporation

Grangemouth.—ELECTRICALLY OPERATED BRIDGE.—An electrically operated bridge has been erected by Sir William Arrol & Co., Ltd., over the canal at Grangemouth. The motive power is supplied by a 10-h.p. motor and the holding wedges are operated by a 3-h.p. motor. Messrs. Crouch & Hogg were the engineers.

Gravesend.—LIGHTING ROCHESTER ROAD.—In view of the unsatisfactory nature of the original lighting and the prevalence of accidents on the Rochester Road, the Council took the matter of its efficient lighting in hand in January and decided upon the use of B.T.H. "Mercra H" lanterns equipped with horizontally burning electric-discharge lamps. The installation comprises twenty-three units mounted on steel columns in staggered formation, except on the bend, and bracket arms give a distance of 30 ft. between the two rows of lanterns. The lanterns are mounted 25 ft. from the road surface and at 150 ft. intervals, the spacing being reduced on the bend.

Halifax.—NEW CONTROL GEAR.—At the luncheon following the switching on of the new control gear, a description of which was published last week, the Mayor of Halifax (Ald. F. Watkinson) congratulated the Electricity Committee on the completion of this important extension to their undertaking. Reviewing the growth of the Halifax undertaking, he said that in 1894, the first year, they had 92 consumers and generated 158,450 kWh. This year they had 22,000 consumers and, at the existing rate of progress, would generate something like 60 million kWh. He paid a tribute to the sales and service organisation of the undertaking and made appreciative reference to Mr. G. A. Vowles, the borough engineer, both on the

New Sub-stations

Plans have been passed for the erection of sub-stations in various parts of the country as follows: In Commercial Street, Newcastle, by the North Eastern Electric Supply Co.; in Lawford Road, Rugby, by the Warwickshire Electric Supply Co.; in St. Helens Road, Prescot, by the Liverpool City Council; on the Leekotwood estate, by the Shropshire, Worcestershire and Staffordshire Electric Power Co.; and in Manor Road, Kidderminster, by the same company; in Durring Road, Sedgley, by the Midland Electric Corporation for Power Distribution, Ltd.; in Highfield Road, Rainham, by the Gillingham Electricity Department; in Minerva Road, Acton, by the Metropolitan Electric Supply Co.; in Bird Street, Lichfield, by the Corporation; in Park Road, Rushden, by the Rushden and District Electric Supply Co., Ltd.; at Vents Farm, Cranbrook, Kent, by the Weald Electricity Supply Co., Ltd.; and at Ball Hill, East Woodhay, by the Wessex Electricity Co. Portsmouth Electricity Committee is seeking sanction to a loan of £1,750 for sub-stations.

engineering side and in the development of sales. Ald. J. H. Waddington, chairman of the Light, Heat and Power Committee, proposed a toast to the Central Electricity Board (represented by Mr. Johnstone Wright, chief engineer, who inaugurated the new plant). Ald. Waddington spoke of substantial savings to the Corporation in consequence of the undertaking becoming a selected station and said that in consequence they had been able to make valuable reductions in price to their own consumers. By economies assisted by modernised plant the Department had been able to face the recent heavy increases in taxation, rates and coal costs without effect on the selling price of their own commodity. Mr. Johnstone Wright, responding, said that the extension showed courage, vision and wisdom in ensuring effective control of the energy generated. Mr. Wright, as a member of a small committee set up by the Electricity Commissioners to consider the minimising of fire risks in electricity works, complimented Mr. Vowles on adopting in a very fine way that committee's recommendations. Mr. Vowles proposed a toast to the contractors (Davenport Engineering Co., Ltd., British Thomson-Houston Co., Ltd., Metropolitan-Vickers Electrical Co., Ltd., and E. & T. Bower, of Halifax). Mr. J. S. Peck (Metropolitan Vickers), replying, on behalf of all contractors, presented two silver candelabra to the Mayor and a silver mounted tea tray to Ald. Waddington. Mr. J. H. Shaw (Davenport Engineering Co.) supplemented the reply by Mr. Peck.

Largs (Ayrshire).—ILLUMINATIONS.—It has been decided that the full scheme of illuminations will be in operation this summer for seven weeks instead of the usual two weeks.

London.—HACKNEY.—The consent of the Electricity Commissioners has been obtained to the Council borrowing £100,000 for a turbo-alternator and condensing plant and £15,000 for assisted wiring.

It is proposed to establish a transformer centre in the Hindle Street area, involving an expenditure of £3,950. A complete distributing system will be laid round the Hindle Street estate, with the necessary service connections to the various blocks and with conduits into Arcola Street to deal with cabling external to the estate and for the high-voltage supply to the sub-station.

It has become necessary to increase the capacity of the mains and transformers between the Hackney generating station and the Stoke Newington point of supply, and the Stoke Newington Borough Council has requested the Department to carry out the necessary works on its behalf, the cost amounting to £3,700.

The policy of many undertakings of including a coal clause in their industrial two-part tariffs has not so far been adopted by the Electricity Department, and no change is recommended at present, although if the price of coal continues to rise it may be necessary to review the position. The increasing costs, however, have made a general revision of charges unavoidable, and changes which it is proposed to enforce as from October 1st next are estimated to bring in an additional revenue of £12,500 towards the £30,000 increase in costs. The lighting flat rate is to be raised from 4¼d./3½d. to 4½d./3½d. per kWh; the lighting maximum demand tariff from £9 10s. to £10 per kW of m.d. per annum, with ¼d. per kWh as before; the industrial power flat rate from 1⅝d. to 1½d. per kWh, and the industrial power m.d. tariff from £4 5s. to £4 10s. per kVA of m.d. per annum, with the "unit" charge as before. Under the domestic tariff there will be a fixed charge of 4d. a week for premises up to 450 sq. ft. and 1d. a week for each additional 100 sq. ft., instead of scaling upwards from £1 6s. per annum for dwellings of 740 sq. ft., with "unit" charge as before. The domestic tariff under which the fixed charge is based on lamp wattage is to be withdrawn.

FULHAM.—The Electricity Committee has had under consideration a scheme prepared by the London Passenger Transport Board for advertising the uses of electricity by the display of several types of small advertisements in trams, trolley-buses and central motor-buses. The advertisements will not give the names of individual undertakings, but will contain some such wording as "Further particulars from your local electricity undertaking." The scheme will operate for three years and all the London companies and all except three of the municipal undertakings have agreed to participate. The Committee is in favour of joining in the scheme, the amount payable (on the basis of annual revenue) being £120 a year.

The induced draught fans at the power station are at present controlled by two-speed motors with vane control of the fans by Tate units. An alternative method of varying the output of the induced draught fans is by means of a hydraulic coupling, in which several important improvements have recently been made. An offer has been received from the Hydraulic Coupling & Engineering Co., Ltd., to supply and erect a hydraulic coupling for one of the induced draught fans, free of charge, for a trial period, and the acceptance of this offer has been authorised. The cost of the fitting, if purchased, will be between £300 and £400.

Middlesbrough.—PRIVATE GENERATION FOR SANATORIUM.—The Poole Sanatorium Joint Committee has decided that electricity for the new £177,000 sanatorium about to be built shall be generated by plant installed in the grounds.

Paisley.—HIRE OF COOKERS.—The Electricity Committee is considering a proposal that in connection with the hire of electric cookers a time limit shall be fixed at the end of which they will become the property of the tenants.

Peterborough.—PUBLIC INSTITUTION LIGHTING.—Tenders are being invited for electric lighting, power and bell installations at Peterborough Public Assistance Institution.

Portsmouth.—TOWER WAGON.—The Electricity Committee has authorised the purchase of a tower wagon at an estimated cost of £550.

Preston.—A GOOD YEAR.—The electricity undertaking has had a record year, additional consumers numbering 4,018 against 3,500 in any previous year, bringing the total connected to 41,695. The Corporation generated and purchased 188 million kWh, as compared with 174 million kWh during the previous year. The amount sold and distributed was as follows: heating, lighting and cooking, 46 million kWh (42 million kWh for the previous year); motive power 23 million kWh, and bulk supplies 111 million kWh.

India's Electrical Need

From our Bombay Correspondent

THE first All-India electrical conference was held at Calcutta recently, when the need for a national electrical policy was discussed. In opening the conference, the Hon. N. R. Sarkar (Government of Bengal) pointed out that India was far behind the advanced countries of Europe in the consumption of electricity, and that only 3 per cent. of its electrical resources had yet been tapped.

Mr. Muckerji, who presided, did not wish India to imitate the methods or systems which had been adopted in other countries, but desired that India should devise her own scheme of utilisation and electrification in conformity with the physical and climatic conditions of the country. His chief suggestion was the establishment of a properly equipped scientific and engineering research department for the development of the resources of the country on sound commercial and scientific lines. In his opinion, the personnel of the research department should be composed mainly of Indian science and engineering graduates, to be trained and controlled by experienced engineers and scientists, a large number of whom would have to come from foreign countries.

The conference urged that the Government of India should appoint a committee of experts to investigate industrial and rural electrification for the development of the resources of the country and to formulate schemes for a national grid system in every autonomous province of India. It was further agreed to ask that the Government and the provincial governments should together consider the question of establishing a department for scientific, industrial and engineering research, and that the Government should help deserving firms which undertook to manufacture electrical machinery and other products and to electrify the railways where such electrification proved to be more economical than the present system.

The Government of Bengal, it was felt, should move in the matter of developing the hydro-electric resources of Bengal as recommended in the report on the hydro-electric survey of India, and that the Government should employ trained Indian electrical engineers as far as possible in future. The Government of India should fix cheaper railway fares for the carrying of coal, oil and other necessaries for electricity supply companies in order to enable them to generate and supply electricity at a cheap rate.

An important question which has been referred to a sub-committee for consideration is whether 230-V a.c. is suitable and safe for domestic use, or whether further restrictions should be imposed to render it safe.

In the course of a symposium on "India's Power Supply" held at the annual meeting of the National Academy of Sciences under the chairmanship of Pandit Jawaharlal, Prof. Meghnad Saha, a well-known physicist, expressed the opinion that the Government of India did not proceed on scientific and modern lines in the matter of electrical development. On the whole, he said, the conditions of power supply in India were years behind the times, and despite the modern advances in methods of production, the old high charges were practically maintained. As the development of cheap and abundant power was a prime duty of the State, Prof. Saha was of the opinion that a Power Supply Department should be created to make a systematic survey of the available sources.

Certain electric supply companies in Bombay have agreed to reduce their rates for power consumption, thus enabling the Government to levy a higher duty. The Bombay Electric Supply and Tramways Co. and the Bombay Suburban Electricity Co. have consented to reduce their charges by half an anna, the Surat Co. by three-quarters of an anna, and other companies by quarter of an anna. The Madras Government is now considering the question of reducing the electricity rates still further. The last time they were reduced was towards the end of 1936.

Rugby.—MAINS.—Proposed reorganisation of the low-voltage system, and relaying of mains in Rugby is estimated to cost £1,744. Mains extensions in Bilton Road will cost £669.

St. Cyrus.—QUARRY ELECTRIFICATION.—Kincardine County Roads Committee has approved a £7,000 scheme for the electrification and modernisation of Taylorspark Quarry, St. Cyrus. There will be an annual saving of £600 as a result of the improvements.

Sheffield.—SUPPLY EXTENSION.—The Electricity Committee proposes to afford a supply of electricity to the works of the English Steel Corporation, Ltd.

Southend-on-Sea. — NO JOINT DEVELOPMENT COMMITTEE. — Following replies received from forty-two towns, the Electricity Committee has decided that no useful purpose would be served by the establishment of a joint development committee as recently suggested by the local Chamber of Trade. It desires, however, that the meetings between representatives of the electrical contractors and the electrical engineer should continue.

Stafford.—DOMESTIC APPLIANCES.—The Town Council is recommended to borrow the sum of £10,000 for domestic appliances to be hired to consumers.

Stockport.—NEW STREET LIGHTING.—Street lighting at Shaw Heath and Adsworth Lane East has been greatly improved under the direction of Mr. G. H. Oldroyd, the borough electrical engineer. The forty-four 125-W "Osira" electric-discharge lamps installed are housed in small G.E.C. "Oxford" lanterns, mounted on semi-swan-neck standards. The steel columns are arranged in staggered formation and carry special bracket arms which project slightly over the kerb edge towards the centre of the roadway.

Sunderland.—ILLUMINATIONS.—The Town Council has approved a £550 scheme prepared by the borough engineer for the illumination of the boating pool at Seaburn. The work will be carried out by the Electricity Department.

Tiverton.—CABLES.—Application is to be made by the Town Council for sanction to borrow £3,000 for new cables and other plant necessary to complete the change-over to A.C.

RURAL SUPPLIES.—The Culm Valley Electric Supply Co. is extending its mains to provide an electricity supply to Sampford Peverell.

Thanet.—OVERHEAD CABLES.—The Eastry Rural District Council has decided to raise no objection to the erection of overhead lines from Laundry Hill, Minster, to Way, the South-East Kent Electric Power Co. having stated that the cost of underground cables would be prohibitive. Similar action has been taken with regard to the erection of a low-voltage overhead line from the Parsonage, Monkton, to the roundabout on the Ramsgate-Sarre road.

Tobermory.—ELECTRICAL DEVELOPMENTS.—It is proposed to extend the hydro-electric power station and also lay three miles of underground high-voltage cable for a supply of electricity to the G.P.O. for a new wireless station in connection with the Outer Isles telephone system.

Tonbridge (Kent).—MAINS AND SERVICES.—Sanction has been received to a loan of £10,000 for mains and services.

West Hartlepool.—CABLES.—An additional cable is to be laid by the Town Council from the Clifton Street sub-station to Throston Bridge.

Wellingborough.—LIDO FLOODLIGHTING.—Constructional estimates for a proposed £13,000 lido in Castle Fields, Wellingborough, include £200 for floodlighting.

ELECTRICITY FOR COUNCIL ESTATE.—The Urban District Council has decided that provision shall be made for both gas and electricity services to be available on the new Croyland road housing estate.

West Lancashire.—ALLOCATION OF PROFITS.—The Rural District Council recently sent a letter to the Liverpool Electricity Department asking to be allowed to participate in the allocation of profits in view of the fact that there had been a contribution to the City of Liverpool rates. The town clerk, in reply, pointed out that when the area was transferred in 1929 the cost per kWh in Maghull, &c., was 2.49d., while the average price realised in the same area during the year ended March, 1937, was 1.11d. per kWh.

Wrexham.—ELECTRICITY CHARGES REDUCED.—The Electricity Distribution Company of North Wales and District, Ltd., has notified the Wrexham Rural District Council that as from all meter readings on July 1st next the "unit" rate of the residential tariff "B" will be reduced to ¾d. above 50 kWh a quarter, the initial charge remaining at 1½d. The Council has decided to ask the company to review the charges for connecting individual consumers to their mains and also to extend the supply to Rhosrobin.

Traction

London.—INQUIRY INTO "UNDERGROUND" ACCIDENT.—Last Friday a Ministry of Transport inquiry into the circumstances of the collision on the Underground Railway near Charing Cross station, when six people were killed and a number injured, was opened at the offices of the London Passenger Transport Board by Lieut.-Col. E. Woodhouse, inspecting officer of railways. Mr. J. P. Thomas, general manager of the Board's railways, said that the signalling system on the District line consisted of automatic and semi-automatic signals, all of which were controlled by track circuit, a system designed to ensure that a signal was not operated to the clear position while a train was standing on a section of the track which it was intended to protect. The eastbound starting signal at Charing Cross failed to give that security on the occasion of the mishap. The Board had made the closest investigation into this failure and had ascertained that it was due to a wrong connection made in the course of alterations to the installation the previous night. The check test required and provided also failed. The faults were not in the system of signalling, but in the way in which the signal was dealt with in the course of maintenance. The Board was taking steps to tighten up the procedure so as to prevent as far as humanly possible a repetition of such faults. Questioned as to emergency lighting arrangements in the trains, Mr. Thomas said there were the guard's oil lamp and the driver's oil lamp, and at the stations of the District Railway a battery of hurricane lamps was provided, to be taken into the tunnels when required. There had never been an occasion so far as he could recollect when the need for their general emergency lighting had been so marked as on this occasion, and the Board was taking steps to consider what additional means of lighting it should provide. After further evidence had been given the inquiry was continued in private.

Southern Railway.—THE LIVE RAIL.—In reply to a question by Brig.-Gen. Clifton Wood in the House of Commons on May 19th the Minister of Transport said that no one had been killed by contact with the live rail on the Southern Railway Company's lines since the beginning of the year and the only member of the public injured in this way was a child who gained access to the line from a level crossing. The company had stated that at the end of April twelve miles of the new diamond mesh fencing had been erected and a further thirty-seven miles were in hand.

In the Courts

Ownership of an Electrodeposition Process

IN the Chancery Division on May 13th Mr. Justice Bennett heard a motion brought on behalf of British Corrodeless, Ltd., and Webbmetising, Ltd., for an injunction to restrain until the trial or further order Mr. H. M. Webb, Enfield, and Mr. F. C. H. Katon, Staines, from representing that the plaintiffs were not entitled to the sale and exclusive benefit throughout the world of all processes, inventions and improvements relating to the prevention of rust and corrosion by the electrical deposition of metals, devised, made and owned by the defendants or either of them and the patent rights of which were assigned to the plaintiffs. The defendants appeared in person to resist the motion.

Mr. Katon said he was sorry that Mr. Webb and he were unable to obtain the means to instruct a solicitor and counsel. This matter had been sprung upon them. They were only working men and plaintiffs were trying to deprive them of their livelihood. Mr. Webb was a clever inventor.

Mr. K. E. Shelley, K.C., in support of the motion, said that Mr. Webb had assigned his rights. Mr. Shelley read the agreement of assignment and submitted that the plaintiffs were entitled to the invention by virtue of the agreement.

His Lordship told the defendants that there was a department to which they could apply for legal assistance and he thought it was a case in which they should be legally represented.

Mr. Shelley asked that his Lordship would grant the injunction even though the motion had to stand over. His Lordship said he would not do that at the moment. Defendants had intimated that they desired to be legally represented and in the circumstances he should stand the motion over for a week.

On May 20th, when the hearing of the motion was resumed, Mr. Shelley said that since the adjournment the defendants had put in affidavit evidence which made it clear that it was not a case for interlocutory relief but for an early trial of the action.

His Lordship accordingly made no order on the motion except that the costs should be costs in the action and that pleadings should be delivered so as to enable an early trial to take place.

Inability to Supply

A case of unusual interest relating to the right of tenants to demand a supply of electricity from the Corporation was decided on May 20th in Glasgow Sheriff Court. The Corporation of Glasgow, as the authority for the supply of electricity in the city, was charged at the instance of four tenants in respect of its failure to supply electricity, the necessary applications for which had been made.

The Corporation's defence was that the proprietor of the property refused to allow them to take the cables into the building, after tenants had arranged with a contractor for the necessary installations in their houses. Sheriff Guild expressed the view that this attitude of the proprietor of the property exonerated the Corporation from responsibility, and found it not guilty.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Adwick-le-Street.—June 11th. Electricity Department. One 150-kVA transformer with off-load tap changer, h.v. switchgear and ring main controller, h.v. and l.v. cables and one l.v. distribution panel. (See this issue.)

Amble.—June 15th. Electricity Department. L.v. mains and service cables and concrete lamp standards. (See this issue.)

Argentina.—BUENOS AIRES.—June 7th. Navigation and Ports Department. 287,500 metres of welding electrodes. (T.Y. 21507/38.)*

July 4th. National Sanitation Works Department. One generating set for the power station at Casilda, Province of Santa Fé. (T.Y. 22122/38.)*

Belfast.—June 3rd. Electricity Department. Steam separator for Harbour power station and steel poles for street-lighting lanterns. Coal for twelve months (approx. 175,000 tons). (May 20th.)

Bexley.—June 20th. Borough Council. P.i. underground cables for twelve months. (See this issue.)

Birkenhead.—June 9th. Corporation. One electric bed lift for the Municipal Hospital, Church Road. Town Clerk, Town Hall (deposit £1 1s.).

Birmingham.—May 30th. Electric Supply Department. House service meters for six months. (May 13th.)

June 16th. Baths Department. Electric lighting and power installation at Monument Road baths. (See this issue.)

Caithness.—May 28th. Education Committee. Heating and electrical work in connection with additions and alterations at Castletown school. D. W. Georgeson, clerk, Wick (deposit £2 2s.).

Cardiff.—June 13th. Electricity Department. Twelve three-phase transformers. (May 20th.)

Cheadle and Gatley.—June 20th. Electricity Department. One 300-kVA transformer with off-load tap changer. (See this issue.)

Cleethorpes.—June 11th. Electricity Department. H.v. switchgear and two 250-kVA transformers. (May 13th.)

Coseley.—May 30th. U.D.C. Electrical wiring of thirty-eight houses at Princes End housing site. Clerk to the Council, Council House.

Dublin.—August 15th. Electricity Supply Board. Mechanical and electrical equipment for Poulaphouca and Golden Fall generating stations. (See this issue.)

Dumfries.—June 3rd. Electricity Department. L.v. underground cables for twelve months. (May 13th.)

June 2nd. Corporation. Installation of electric lighting at the superintendent's house, Public Baths and Washhouse, Greensands. Town Clerk.

May 30th. Dumfries and Galloway Royal Infirmary. Equipment and supplies, including electric water boilers, for the Grove Auxiliary Hospital, Kirkcudbrightshire. J. A. Will, secretary and treasurer, 3, Great King Street.

Dundee.—June 10th. Electricity Department. Four 15,000 kVA transformers, 33,000-V switchgear, carbon dioxide fire extinguishing equipment, 33,000-V reactors, 33,000-V and 6,600-V neutral earthing equipments, 200-V accumulator battery and auxiliary apparatus and cabling. (May 20th.)

Ealing.—May 30th. Electricity Department. Jointing materials, pavement frames and covers and general stores for twelve months. (May 13th.)

Eastbourne.—June 9th. Electricity Department. Meter-testing equipment. (May 20th.)

Edinburgh.—June 3rd. Corporation. Electric lighting installation at Balfour Place school. Town Clerk.

Egypt.—CAIRO.—June 7th. Ministry of Public Works. Three 65-kW, Diesel d.c. generating units. (T.Y. 21605/38.)*

July 12th. Two alternators, accessories and spares, ice-making plant and small filter, floating pumping station complete with auxiliaries, and an overhead transmission line for Eneiba Markaz Nubia. (T. 22190/38.)*

Epsom and Ewell.—June 20th. Electricity Department. One sheet-steel kiosk. (May 20th.)

Exeter.—June 6th. Electricity Department. Cable and one 6,000-kVA transformer. (May 13th.)

Farnworth.—June 7th. Electricity Department. L.v., p.i. cables, 400-V, three-phase, l.v. switchboard and l.v. distribution pillars. (See this issue.)

Heston and Isleworth.—June 10th. Electricity Department. Fifteen reverse power relays. (See this issue.)

India.—June 24th. Assam-Bengal Railway Co., Ltd. One 25-ton electric travelling crane. 56, Victoria Street, London, S.W.1 (deposit £1 1s.).

Leeds.—June 8th. Public Assistance Committee. Electric bed lift for North Lodge, 123, Beckett Street. Town Clerk, Room 57, Civic Hall.

London.—ST. MARYLEBONE.—June 11th. Borough Council. Electrode boiler and thermal-storage plant, and heating and ventilating plant. (See this issue.)

HAMPSTEAD.—June 9th. Borough Council. Electrical installations in 140 flats at the South End Close housing estate. (See this issue.)

Leyton.—June 10th. Corporation. Removal of existing wiring and provision of new electric lighting and power installation at Capworth Street school, and electric lighting installation at Ruckholt central school. (May 20th.)

Liverpool.—June 1st. Electric Supply Department. Two 50-Ah, 230-V control batteries. One 22,000-V, 500,000-kVA switchboard and one 10,000-kVA, one 4,000-kVA, and four 8,000-kVA transformers. Extensions to existing switchboards embodying circuit-breakers. (May 13th.)

Middlesbrough.—June 17th. Electricity Department. 11,000-V circuit-breakers and 250-kVA transformers. (See this issue.)

New Zealand.—WELLINGTON.—August 30th. Public Works Department. 110-kV outdoor switchgear and steelwork for Section 455 of the Mangahao scheme. (T. 21962/38.)*

August 30th. Seven oil circuit-breakers. T. 22102-38.)*

July 12th. Public Works Tender Board. Protective relays, switchboard panels and accessories for the selective protection of 110-kV transmission lines in the Mangahao-Waikaremoana district. (T. 22104/38.)*

Nottingham.—June 8th. Electricity Committee. General stores and cables for twelve months. (May 20th.)

Nuneaton.—June 4th. Electricity Department. One mercury arc rectifier kiosk. (May 13th.)

Peterborough.—May 30th. County Council. Electric lighting, power and bell installations in new Pubic Assistance Institution block. W. J. Deacon, Clerk of the County Council, Bridge Street (deposit £2 2s.).

Plymouth.—June 18th. Corporation. Automatic telephone exchange equipment. (See this issue.)

Preston.—June 14th. Electricity Department. House service electricity meters. (May 20th.)

June 17th. Domestic water-heating apparatus. (See this issue.)

St. Andrews.—May 31st. Town Council. Electrical work at eighty-four houses. Town Clerk (deposit £1).

Sheffield.—June 14th. Electricity Department. Meter-testing equipment. Automatic and manual fire-fighting installations, and fourteen 600-kVA and five 300-kVA transformers for Blackburn Meadows generating station. (See this issue.)

South Africa.—JOHANNESBURG.—June 18th. City Council. Four portable voltmeters and four portable ammeters. (T. 21566/38.)*

June 22nd. Electric lamps. (T.Y. 21854/1938.)*

PRETORIA.—June 1st. City Council. 8,400-yd. of 11,000-V, p.i. and lead sheathed cable. (T. 22155/38.)*

CAPE TOWN.—June 29th. Electricity Department. Two batteries and two battery-charging equipments. (T.Y. 22151/38.)*

Stoke-on-Trent.—June 15th. Electrical Engineer's Department. Replating of and alterations to battery at Stoke sub-works. (May 20th.)

Tunbridge Wells.—May 30th. Corporation. Electrical installation at the new police court and station. (May 13th.)

Turton (LANCS).—June 13th. U.D.C. H.v. overhead mains, h.v. and l.v. underground mains, distribution pillars, 11,000/400-V transformers, steel sub-station kiosks and alterations and extensions to existing kiosks. (See this issue.)

Wakefield.—May 30th. West Riding County Council. Electrical lighting installations at Cudworth Senior and Stanley schools. Clerk of the County Council, County Hall.

Weymouth and Melcombe Regis.—June 14th. Electricity Department. E.h.v. switchgear, transformers and e.h.v. and l.v. mains extension. (May 20th.)

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Bexhill.—Electricity Committee. Recommended for twelve months. Service joint boxes.—Callender's. Cut-out sets.—W. Lucy & Co. Meters: Ordinary.—British Sangamo Co. Prepayment.—Met.-Vick Electrical Co.

Cardiff.—Electricity Committee. Accepted. Testing equipment (£178).—Met.-Vick. Elecl. Co. Switchboard (£141).—English Electric Co.

Chester.—Education Committee. Recommended. Electrical installation at Newton school (£530).—W. Caton & Sons.

Goole.—Town Council. Accepted. Electrical work in connection with the erection of houses: Sixty at Mount Pleasant (£260), forty at Potter Grange (£171), and thirty-nine and eight flats in Morley Street (£190).—R. W. Brown.

London.—L.C.C.—Education Committee. Accepted. Electric lift at Abbey technical institute (£1,323).—Bennie' Lifts.

Electrical work at Demsey Street school, Mile End (£1,313).—Jacob White & Co.

HACKNEY.—Electricity Committee. Recommended. E.h.v. feeder cable in connection with bulk supply to Stoke Newington.—B.I. Cables.

STEPNEY.—Finance and Parliamentary Committee. Recommended for twelve months. L.v. armour-clad switchgear (£389).—G.E.C. Four-way and six-way l.v. distribution units (£578) (additional price for one extra way of each capacity specified. £58).—W. Lucy & Co. Street pillars (£181).—B.I. Cables. Electric fires (£721).—Revo Electric Co. Flexible cables (£124).—Ward & Goldstone. Teak blocks (£236).—Revo Electric Co. Plugs and sockets (£657).—C. H. Parsons.

Equipment in connection with the change-over from d.c. to a.c.: Mile End Road area (£961).—L. G. Tate & Co. Alderney, Argyle, Bancroft and Globe Roads, Grafton Street area and 68, Commercial Street (£930).—City Electrical Co.

HAMMERSMITH.—Electricity Committee. Recommended. Two 250-kVA, single-phase, air-cooled transformers (£250 each).—British Electric Transformer Co.

STOKE NEWINGTON.—Electricity Committee. Recommended. One oil switch panel as extension to existing metal-clad board in Edward's Lane (£467), sixteen automatic trunk panels (£1,552), two truck-type section switch panels (£121), and nine metal-clad panels (£234).—G.E.C. Installation of rising mains at Hewling Street flats.—Strand Electric Co.

Portsmouth.—Contracts Committee. Accepted. Cable.—Johnson & Phillips. Meter testing equipment (£869).—Landis & Gyr.

Newcastle-on-Tyne.—City Council. Accepted. Two sets of deep therapy X-ray apparatus at the City General Hospital (£2,940).—Victor X-ray Corporation.

South Africa.—CAPE TOWN.—Electricity Committee. Accepted. Switchgear (£21,610).—A. Reyrolle & Co. Spares for Table Bay power station: Water tube boilers and other plant (£5,676), steel frame buildings (£53) and overhead electric cranes (£207).—Babcock and Wilcox. 40,000-kW turbo-alternators (£2,051) and condensing plant and auxiliary apparatus (£335).—C. A. Parsons & Co. Switchgear and auxiliary plant (£2,370).—A. Reyrolle & Co. Piping equipment (£2,007).—Stewarts and Lloyds of S.A. Circulating water pumps and screens (£991).—Drysdale & Co. Coal-handling plant (£333).—Birtley Co. Central evaporating plant (£93).—Richardsons, Westgarth & Co.

Sunderland.—Town Council. Accepted. Electric lighting installation at school on the Ford estate (£114).—Watson, Norie. Installation of electric lifts at the Sir John Priestman Technical College (£349).—Evans Lifts.

Notes

World Power Conference

The subjects to be dealt with at the 1938 sectional meeting of the World Power Conference, which is to be held in Vienna from August 25th to September 2nd, are listed under five headings: The supply of energy to agriculture, to small-scale industries, for public lighting, the household, and for electric railways. Of more than 200 papers to be presented and discussed, thirteen are from this country. Mr. J. W. Beauchamp will present a paper on "The Supply and Use of Electricity in the Home," and Mr. J. N. Waite (Central Electricity Board) is to deal with "The Supply of Electricity for Small-scale Industries" jointly with Mr. F. H. Clough, C.B.E., assistant chief engineer to the British Thomson-Houston Co., Ltd.; Mr. W. J. Jones (E.L.M.A.) will present a paper on "Electric Lighting for Streets and Transport"; Mr. C. A. Cameron Brown, technical expert on rural electrification of the E.R.A., will deal with "The Supply of Electricity for Agriculture"; and Mr. F. Lydall (Merz and McLellan) has for his subject "The Requirements and Supply of Energy for Electric Railways." There is to be a paper on "Street Lighting" as a separate subject by Dr. H. F. Gillbe, secretary to the Ministry of Transport Departmental Committee concerned.

The official opening session in the Vienna Concert House is to be at 10 a.m. on Thursday, August 25th, and, with the interval of Saturday and Sunday for visits to places of interest, the business of the meeting will go on until Friday, September 2nd. The papers will be summarised in the usual way, and, as is also customary, discussions at times will be carried on simultaneously in more than one hall. An excursion to two fully electrified farms is one of the items scheduled for Saturday, August 27th, and after the closing session on September 2nd one of the Vienna power stations may be inspected. The following week there will be "conference journeys." One party, on the way to Salzburg, will visit the iron ore mountain of Erzberg and will travel for a section of the trip in the new Diesel-electric rail cars; and the second party, taking another route, will see the Mur River hydro-electric power station at Mixnitz and the Stubach hydro-electric stations, one of which is in the course of construction. Joining forces at Salzburg, the whole party will go on to Innsbruck, and on the seventh day visit the Burs transformer station, where current from the Vorarlberg hydro-electric generators is stepped up to 220,000 V for transmission to the Rhineland, and to the storage basin. The British National Committee, World Power Conference, 36, Kingsway, London, W.C.2, invites early application.

E.A.W. Activities

The summer programme of the London branch of the Electrical Association for Women includes visits to Electric House, Willesden; the International Health and Education Centre, Lawrence Weaver House, Leatherhead; and the Ford Motor Works, Dagenham.

I.E.E. Conversazione

The conversazione of overseas members of the Institution of Electrical Engineers will be held at the Institution, Savoy Place, London, W.C.2, on June 16th. Guests will be received by Sir George Lee, the president, at 8.30 p.m., following which short addresses will be given by Mr. H. Nimmo on "Electricity in Burma," and by Major B. Binyon on "Accelerated Motion Cinematography in Natural Colours" (illustrated by a cinematograph film). The evening will conclude with a reunion in the library.

Electricity in Mines

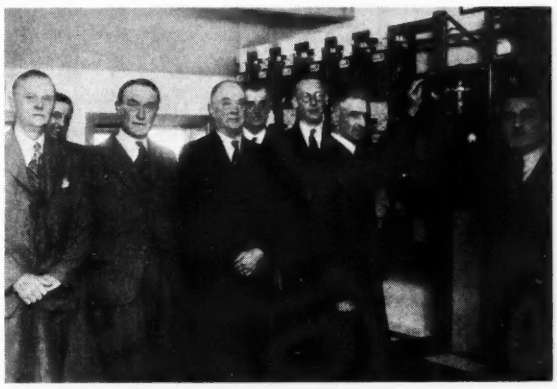
The Secretary for Mines announces the publication of a new edition of the booklet (M. & Q. Form 11) containing the general regulations relating to the use of electricity at mines under the Coal Mines Act, 1911, with explanatory notes. In the new edition the electricity regulations applicable above and below ground have been combined, distinctive type being used to differentiate them, and each regulation is followed by an explanatory note or comment. These notes have all been revised and brought up to date; some have been completely rewritten and new matter has been added. The appendices include the lighting regulations of 1934, with comments thereon, notes on the repair of trailing cables, suggestions for the routine examination and test of cables and apparatus, a symposium on the subject of safe signalling circuits and telephones, and a memorandum by the Medical Inspector of Mines on the physiology of electric shock and its treatment. Copies of the booklet (by post 1s. 2d.) may be obtained from H.M. Stationery Office, Kingsway, W.C.2.

Non-statutory Undertakings

Communications with regard to Mr. Theodore Stevens's letter published in our issue of May 6th should be sent direct to Mr. Stevens at 11, Dence Park, Herne Bay, Kent, and not to the ELECTRICAL REVIEW.

Barnoldswick Meter-testing Station

The new meter-testing station of the Barnoldswick Urban District Council was formally opened on May 14th by Mr. J. Wood, chairman of the Electricity Committee, who said that Barnoldswick was one of the few smaller authorities which had been permitted to carry out such a scheme. Referring to the progress of the undertaking, he mentioned that they had introduced a scheme whereby electric cookers could be put into general use, and as a result they now had a peak load round about Sunday dinner-time as well as on weekday evenings when shop lighting was at full pressure. By doing this



The official opening of the Barnoldswick Meter-testing station showing (left to right), Councillor A. Carr, Mr. G. W. Rickards, M.P., Councillor F. Baldwin, Mr. J. A. Pickles, Mr. J. Bailey (electrical engineer and manager), Councillor J. Wood, and Mr. S. G. Isaacs (area meter examiner)

they were buying electricity more cheaply than previously and had passed on the benefit to consumers by abolishing the charge originally made for installing cookers and other appliances. Another improvement had been the introduction of two-part tariff meters. Through the initiative of Mr. J. Bailey, the electrical engineer and manager, they were putting down a h.v. ring main, which would be completed towards September. Most of the cable necessary for the district had been laid, and all that remained to be done was the laying of short lengths as required. Recently the Council had been negotiating for a duplicate 33-kV main, and this would be laid from Nelson with the sanction of the Electricity Commissioners.

Telephones in Japan

Recent applications for new telephone installations in Japan are said to have broken all previous records, particularly in the large urban areas, states *Reuter* from Tokio, where only 7,600 new connections are available, and more than 260,000 applications have been received. In Osaka there are 5,600 connections available, and some 175,000 have been applied for. In Tokio, immediate telephone connections command as high a figure as 1,400 yen (£82) and in Osaka 1,300 yen (£76).

Appointments Vacant

Borough electrical engineer for Bedford.

Maintenance engineer and assistant engineer for S.W. Essex College and School of Art, Walthamstow.

Scientific officers in the War Department.

Shift engineer for Crewe Electricity Department.

(See our classified advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

DURO safety lampholders.

UNIVERSAL testing set (formerly International Elec. Co., Ltd.).

WADE hairdryer.

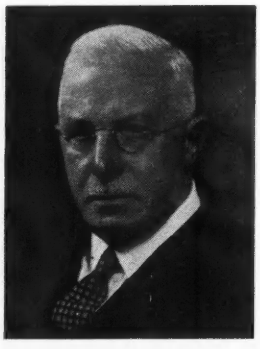
UNIPOLAR, BIPOLAR and BOUDINEUSE cables.

Readers should enclose stamped addressed envelopes when making their enquiries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. R. W. L. Phillips, M.I.E.E., borough electrical engineer at Bedford, is retiring shortly, after thirty-seven years' service with Bedford Corporation. Mr. Phillips was educated at Bristol Grammar School and in 1889 became an articled pupil with the Taunton Electric Lighting Co., which was purchased by Taunton Corporation in 1893. In 1894 he joined the Bristol Corporation Electricity Department, where he held the successive appointments of charge engineer, mains superintendent and deputy city electrical engineer. He was appointed borough electrical engineer at Bedford in 1901, when the sales of electricity were 650,000 kWh and the maximum demand 550 kW. The sales to-day total over 60 million kWh per annum, and the maximum demand is 19,200 kW. Mr. Phillips joined the R.F.C. in 1917 for the purpose of instructing pilots and observers, and was demobilised in 1919. Since 1930 he has been working out an experiment in the intensive electrification of 100 sq. miles of rural area on somewhat unusual lines. He has been a member of the I.M.E.A. since 1896 and was elected a member of the Council in 1921, being president in 1926-27. He has represented the Association on the Electrical Industry Committee of the British Standards Institution and on several committees of the I.E.E. and the B.S.I. Mr. Phillips is a member of the National Consultative Committee of the Central Electricity Board, and has represented the Board on the Council of E.D.A. He was chairman of E.D.A. in 1931, and has been a member of the No. 9 District Joint Industrial Council and the District Joint Board since their inception.



[Lafayette
Mr. R. W. L. Phillips

Mr. W. E. Appleton, of the Bermondsey Borough Council, has been promoted to the position of chief technical assistant from distribution engineer, which position he has held for seventeen years. His previous positions were as distribution engineer with the Leigh, Lancs., Council, and the Nuneaton Electricity Department. He also held positions at Birkenhead and at Kilmarnock, and was test room assistant at H.M. Dockyard, Plymouth. Commencing his electrical engineering career with the Norwich Corporation Electricity Department in 1902, Mr. Appleton has had thirty-six years in the electricity supply industry.

Mr. R. W. J. Benyon, of the Basingstoke Corporation Electricity Department, has been appointed consumers' engineer with the Beckenham Corporation Electricity Department.

Mr. J. Rowan, general secretary of the Electrical Trades Union, has been appointed chairman of the Joint Industrial Council for the Electricity Supply Industry for the ensuing year, and **Ald. Walker,** of Manchester, has been appointed vice-chairman.

Mr. R. T. Hudson, chief electrical engineer to the Delagoa Bay Development Corporation, Ltd., Lourenço Marques, Portuguese East Africa, will be in this country for four months, during which he will visit the various electrical companies with which his company does business. Mr. Hudson was appointed chief electrical engineer at Lourenço Marques in 1932. The Delagoa Bay Development Corporation supplies light, power and water to the town.

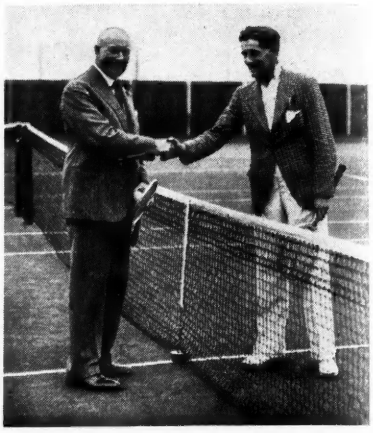
Mr. R. T. Hudson

Mr. T. B. Keep, who was recently appointed a director of the Brush Electrical Engineering Co., has now been appointed managing director of that company.

Mr. S. Coote, previously representative for Wilec, Ltd., has been appointed manager of the company's depôt at 28, Victoria Street, S.W.1. (Telephone No.: Abbey 4170).

Mr. J. N. Atkinson, engineer and manager of Wick Corporation Electricity Department, has been appointed manager of the Perth Corporation's undertaking in succession to Mr. J. Lambert, who has retired under the age limit. Mr. Atkinson has been manager at Wick for four years. Previously he was with Edinburgh Corporation for five years, and had supervision of the switchgear at Portobello power station. For a time he was with the International Power & Paper Co., Newfoundland, and was also senior operator for three and a half years in charge of the 100,000-kW hydro-electric station at Deer Lake. For four years Mr. Atkinson was on the construction staff of the British Thomson-Houston Co., Ltd., with whom he served his apprenticeship. His technical education was gained at the Heriot Watt College, Edinburgh, and the Rugby College of Technology and Arts. He is an A.M.I.E.E., and a member of the American Institute of Electrical Engineers.

Mr. C. D. Taite, engineer and manager of the Lancashire Electric Power Co., officially opened the hard tennis courts that have been provided for the use of members and friends of the M.M. Club (the company's Social and Athletic Club) at Westhoughton on May 14th. Mr. R. C. Leslie, chairman of the M.M. Club, welcomed Mr. Taite, after which Mr. J. W. Jones, chairman of the Tennis Committee, invited him to declare the courts open and strike the first ball over the net. One hundred members and friends attended, among those present being Mr. Stuart M. Rix, secretary of the company, and Mr. A. B. Race, Manchester district manager of the B.T.H. Co.



Mr. C. D. Taite (left), engineer and manager of the L.E.P. Co., opening the hard courts at the company's Social and Athletic Club. He is seen shaking hands with Mr. J. W. Jones, chairman of the Tennis Committee

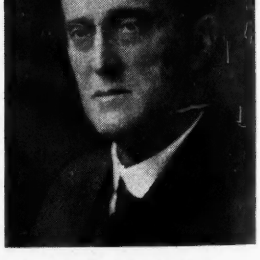
Mr. R. A. Park and **Mr. B. R. Wilson,** both of the Newcastle Electricity Supply Co., have been appointed control engineers to the Croydon Corporation Electricity Department.

Sir Ambrose Fleming, inventor of the thermionic valve, broadcast on May 18th when he spoke on the early days of wireless.

Mr. J. Neill has been appointed a director of Richardsons, Westgarth & Co.

Obituary

Mr. Gilbert Scott Ram.—Readers of the ELECTRICAL REVIEW will learn with deep regret of the death of Mr. Gilbert Scott Ram on May 21st at Bournemouth, after a very short illness. Mr. Ram was borough electrical engineer at Coventry before joining the Factory Department of the Home Office in March, 1902, and as everyone knows, the principle of setting an engineer to catch engineers resolved itself into Mr. Ram devoting the rest of his career to the task of helping others to avoid the pitfalls inevitable with the rapid changes of practice in an ever advancing industry. He will be best remembered in connection with the code of safety regulations issued in 1908, and it is a tribute to his foresight and judgment that a code written so long ago should still be current and effective in a rapidly changing industry. It was brief and conceived in general terms, and no doubt owed much of its success to the masterly memorandum which Mr. Ram wrote by way of explanation. This memorandum is really a text book in the industry, and still sells at the rate of 1,800 copies annually in much the same form as he wrote it. Mr. Ram was pre-eminently fitted for a task where quiet persuasion counts for more than official authority, and engineers were always pleased to see him, even when his visits proved expensive. His work was conspicuously successful, and he created a tradition and occupied a personal position in the industry which will long be remembered.—H. W. SWANN.



The late Mr. G. Scott Ram

Mr. H. H. Denton.—The death occurred on May 19th, at the age of sixty-seven, of Mr. H. H. Denton, who was the first borough electrical engineer at Crewe. Mr. Denton went to Crewe in 1900 to supervise the establishment of the electricity works which were opened in the following year, and he served as borough electrical engineer until his retirement in 1935. The funeral took place on Saturday last, and was attended by members of the Crewe Corporation and Council officials.

Sir Montagu Webb.—The death is announced of Sir Montagu Webb, C.I.E., C.B.E., which occurred on May 5th at the age of sixty-nine. Sir Montagu took an active part in the affairs of Karachi, and was the founder of the Karachi Electric Supply Corporation.

Mr. T. B. Thrige, a director of the T.B.T. Electric Co., Ltd., and founder of the original firm of Thomas B. Thrige, died at his home in Odense, Denmark, on May 10th, at the age of seventy-two. He was a member of the board of the Great Northern Telegraph Co.

Mr. R. H. Stokes.—We regret to learn of the death, which occurred on May 16th, of Mr. R. H. Stokes, who represented the interests of Burco, Ltd., in Yorkshire and the Eastern Counties.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Protos Electric Appliances, Ltd.—Private company. Registered May 14th. Capital, £1,000. Objects: To adopt an agreement, dated April 15th, 1938, between Siemens-Schuckertwerke A.G. of the one part, and J. A. Milne of the other part, for the acquisition of a licence to sell in Great Britain goods bearing the registered trade mark "Protos," and to carry on the business of designers, manufacturers, repairers, exporters and importers of and dealers (whether on hire-purchase or deferred payment system or otherwise) in electrical goods and apparatus, &c. The directors are: J. A. Milne, 39, Lime Grove, Eastcote, Ruislip, Middx., and J. W. Rissik, "Swallows Nest," Denbridge Road, Bickley. Registered office: 30/4, New Bridge Street, E.C.4.

J. J. Eastick & Sons, Ltd.—Private company. Registered May 20th. Capital, £5,000. Objects: To acquire the business of electrical engineers and radio dealers now carried on by J. C. N. Eastick and L. E. K. Eastick as J. J. Eastick & Sons. The subscribers are: J. C. N. Eastick, Ivy Bridge, Oldhill, Chislehurst, Kent, and L. E. K. Eastick, 35, Lynwood Grove, Orpington, Kent. Registered office: Eelex House, 118, Bunhill Row, E.C.1.

"E.C." Radio & Electric Factors, Ltd.—Private company. Registered May 20th. Capital, £300. Objects: To carry on the business of electricians, radio and electrical engineers, &c. The directors are: M. Glaser, 1, Herons Gate, Station Road, Edgware, and P. Wohl, 15, Springfield, Clapton, E.5. Registered office: 141c, Minories, E.C.3.

Ariel Trust, Ltd.—Private company. Registered May 14th. Capital, £100. Objects: To acquire, exploit and sell patents relating to electrical and other apparatus, &c. The directors are: A. Southgate, 2, Wimbledon Park Parade, S.W.19, and R. S. Breese, 97, Buckingham Palace Road, S.W.1.

Annual Lamp Co., Ltd.—Private company. Registered May 14th. Capital, £100. Objects: To carry on the business of manufacturers and repairers of, agents for and dealers in electric lighting, lamps, radiators, fires, cookers, irons, vacuum cleaners, electrical and radio goods, &c. The directors are: Z. Dezsoe, 13, Valentines Road, Ilford. H. Hertzog, 146, Sutherland Avenue, W.9, and F. E. Langhelt, 104, Cranston Park Avenue, Upminster.

Keith Lowe, Ltd.—Private company. Registered May 13th. Capital, £3,000. Objects: To carry on the business of electricians, electrical, radio, mechanical, gas and general engineers, &c. The directors are: K. C. Lowe and Mrs. Lottie Lowe, both of Spring Lea, Spring Head, Sedgley, Staffs.

Returns of Electrical Companies

British Electric Resistance Co., Ltd.—The nominal capital has been increased by the addition of £49,900 beyond the registered capital of £100. The additional capital is divided into 499,000 ordinary shares of 2s. each. The 100 shares of £1 each in the original capital have been subdivided into 1,000 ordinary shares of 2s. The company has also been converted into a public company.

Laurence, Scott & Electromotors, Ltd.—The nominal capital has been increased by the addition of £239,005 beyond the registered capital of £460,995. The additional capital is divided into 100,000 5 per cent. cumulative redeemable preference shares of £1 and 556,020 "A" ordinary shares of 5s. Each of the existing ordinary shares of £1 has been subdivided into four "B" ordinary shares of 5s.

Corlett Electrical Engineering Co. (1933), Ltd.—Satisfaction in full on March 31st, 1938, of a series of debentures authorised by resolution dated July 18th, 1933, and registered July 19th, 1933, securing £125.

Haslingden Radio Relay Co., Ltd.—Capital, £100 in 300 shares of 6s. 8d. Return dated December 22nd, 1937. All shares taken up. £100 paid. Mortgages and charges, nil.

Lincoln Wireless Co., Ltd.—Capital, £1,200 in £1 shares. Return dated October 28th, 1937 (filed January 26th, 1938). 700 shares taken up. £700 paid. Mortgages and charges, nil.

J. A. Burrows & Co., Ltd.—Debenture charged on the company's undertaking and property, including uncalled capital, dated April 8th, 1938, to secure £250. Holder: John A. Burrows, Hill Crest, Granville Avenue, Newcastle-under-Lyme.

Eastern Wireless Co., Ltd.—Capital, £500 in £1 shares. Return dated December 11th, 1937 (filed February 25th, 1938). All shares taken up. £500 paid. Mortgages and charges, nil.

Central Radio Stores, Ltd.—Capital, £1,000 in £1 shares. Return dated March 28th, 1938. All shares taken up. £801 paid. £199 considered as paid. Mortgages and charges, nil.

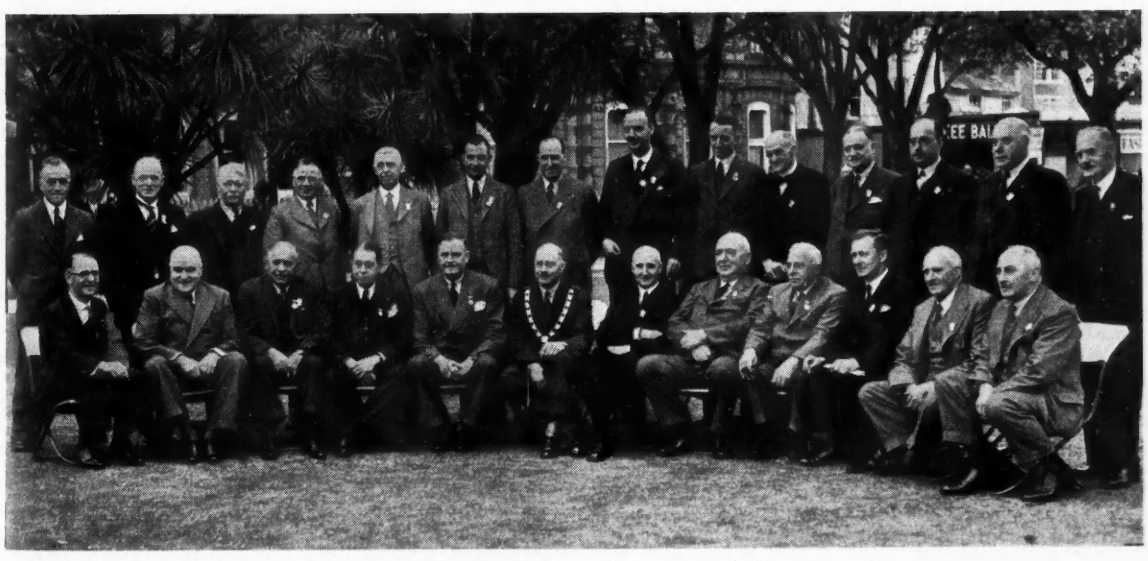
Brighouse Radio Service & Equipment Co., Ltd.—Capital, £1,000 in £1 shares. Return dated July 13th, 1937 (filed March 22nd, 1938). 250 shares taken up. £70 paid. £180 considered as paid. Mortgages and charges, nil.

St. Mary's (Scilly) Electricity Supply Co., Ltd.—Capital, £15,000 in £1 shares. Return dated November 11th, 1937. 10,452 shares taken up. £7,435 paid. £3,017 considered as paid. Mortgages and charges, £5,000.

H. Horsley, Ltd.—Capital, £500 in £1 shares. Return dated April 6th, 1938. 421 shares taken up. £421 paid. Mortgages and charges, nil.

Vent-Axia, Ltd.—The nominal capital has been increased by the addition of £5,000 in £1 ordinary shares beyond the registered capital of £10,000. Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated April 28th, 1938, to secure £4,000. Holders: Michael Moore, Thames House, Queen Street Place, E.C., and John C. Druce, 10, Billiter Square, E.C.

Satisfaction in full on April 28th, 1938, of debenture dated June 10th, 1937, and registered June 21st,



The Council of the I.M.E.A. at Torquay *[Elec. Rev. photo.*

1937. (According to the register of mortgages, the debenture registered June 21st, 1937, originally secured all moneys due to bank.)

Leroy & Richardson, Ltd.—Capital, £3,500 in £1 shares. Return dated December 31st, 1937 (filed March 26th, 1938). 2,700 shares taken up. £2,700 paid. Mortgages and charges, nil.

Woking Electric Supply Co., Ltd.—Issue on April 26th, 1938, of £100,000 debentures, part of a series already registered.

Splendor Lamp Co., Ltd.—Satisfaction in full on March 31st, 1938, of debenture dated December 18th, 1935, and registered December 20th, 1935, securing £10,000.

McEwan & Co. (Brighton), Ltd.—Capital, £500 in £1 shares. Return dated October 5th (filed December 24th), 1937. All shares taken up. £450 paid, £50 considered as paid. Mortgages and charges: £2,500.

Automatic Wireless, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1937 (filed February 16th, 1938). Four shares taken up. £4 paid. Mortgages and charges nil.

Trevor Fry, Ltd.—Wm. E. Carnelly, C.A., of 76a, Chancery Lane, W.C.2, was appointed receiver and manager on May 4th, 1938, under powers contained in debentures created June 3rd, 1937, and January 18th, 1938.

Hart Bros. Electrical Manufacturing Co., Ltd.—Harold W. Humphries, C.A., of Guildhall Annexe, 23, King Street, E.C.2, ceased to act as receiver and manager on May 10th, 1938.

L. Adams, Ltd.—Satisfaction in full on May 2nd, 1938, of first mortgage debenture dated June 16th, 1937, and registered June 22nd, 1937, securing £3,000. First mortgage debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated May 3rd, 1938, to secure £6,000. Holders: Peoples Bank, Ltd., Bentinck Buildings, Wheeler Gate, Nottingham.

Metropolitan-Vickers Electrical Co., Ltd.—Capital, £250,000 in £1 shares. Return dated March 23rd, 1938. 10,002 shares taken up. £10,002 paid. Mortgages and charges nil.

Downton Electric Light Co., Ltd.—Capital, £17,500 in 7,500 preference and 10,000 ordinary shares of £1. Return dated March 24th, 1938. 3,957 preference and 9,000 ordinary shares taken up. £657 paid, £12,300 considered as paid. Mortgages and charges nil.

Stelmar Projection Lighting, Ltd.—Capital, £15,000 in £1 shares. Return dated January 12th, 1938. All shares taken up. £7,600 paid, £7,400 considered as paid. Mortgages and charges nil.

Tyche, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1937 (filed March 4th, 1938). All shares taken up. £100 paid. Mortgages and charges: £1,150.

Ramsdens Patents, Ltd.—Issue on April 27th, 1938, of £300 debentures, part of a series already registered.

D. Lloyd Lewis, Ltd.—Issue on May 5th, 1938, of £500 debentures, part of a series already registered.

Carrington & Button, Ltd.—Charge on land and premises at Crewe, Ches, dated May 2nd, 1938, to secure £850. Holder: Mrs. Jane Bourne, Main Road, Shavington, nr. Crewe.

R.C. Radio-Electric, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1937 (filed May 3rd, 1938). 12 shares taken up. £12 paid. Mortgages and charges: £850.

Radio Resistor Co., Ltd.—Capital, £1,000 in £1 shares. Return dated January 14th, 1938. All shares taken up. £1,000 paid. Mortgages and charges nil.

Requirements Electrical & Engineering, Ltd.—Capital, £500 in £1 shares. Return dated March 9th, 1938. 203 shares taken up. £103 paid, £100 considered as paid. Mortgages and charges nil.

Mackallen Heating Co., Ltd.—Capital, £99 in £1 shares. Return dated December 31st, 1937 (filed January 31st, 1938). 99 shares taken up. £99 paid. Mortgages and charges nil.

City Notes

Siemens Bros. & Co., Ltd., held their annual meeting on May 20th when Lord Queenborough (chairman), who presided, in referring to the reduction in the profit, said that they had expended considerable sums in extensions to buildings and plant, but as these extensions were not available for production until towards the end of the year, the benefit of the increased production facilities was not reflected in the accounts under review, but the rearrangements entailed some dislocation and had necessitated considerable expenditure which had been borne as an expense in 1937. Although the shops' output in 1937 increased over the previous year very considerably, there was a large portion of the output which, due to the particular nature of the work, was in an unfinished state at the close of the year. The training of a large number of hourly employés had increased overhead expenses, and finally a large portion of the output had to be sold at levels ruling in former years, while the cost of production had considerably increased. Submarine Cables, Ltd., owned jointly by them and the Telegraph Construction & Maintenance Co., Ltd., had manufactured a number of telephone cables of improved design and construction. All the cables referred to at the last meeting had been taken into service, increasing the facilities for telephonic communication not only with the Continent but with both Eire and Northern Ireland. The Greenwich factory continued to be fully occupied. The cableship *Faraday* was commissioned for laying two new Anglo-Dutch cables and three cables to Ireland, and would be engaged during the coming summer in laying other new cables made by Submarine Cables, Ltd. Both home and export demands for underground power and lighting cables and their accessories reached a higher level than in the previous year, and the plant was working to full capacity. The continued development of the British Post Office underground cable network, together with extensive orders received from overseas, kept the shops fully occupied. Cables of the carrier-frequency type as laid between London and Oxford had been made and installed between other centres in Great Britain. The special television cable made by them last year and laid in London had proved to be equally suitable for high-frequency telephone transmission. The equipment of a new workshop with the latest type of machinery for the manufacture of underground telephone cables was completed towards the end of the year. The extensions of the Woolwich works and the recently acquired works at Blackheath were now materially helping them to cope with the largest order sheet for telephone exchanges in their history. The Post Office had placed contracts for the manufacture and installation of seventy-six public telephone exchange equipments, and orders from overseas for such equipments were from Canada, South Africa, Sudan, Guernsey and Iran. Orders for telephone apparatus and materials received from the Post Office and from overseas administrations included nearly 200,000 telephone instruments and over 300,000 telephone transmitters. Substantial orders had also been received for rural automatic exchanges. Their sales, rental and maintenance business in private telephone equipments had been well maintained both at home and overseas. During the year a considerable number of existing electric totalisator equipments had been extended and new installations brought into service. Orders for ships' telegraphs and telephones and torsion-meters as well as wireless equipments had substantially increased, and overseas orders showed a slight expansion. Siemens Electric Lamps & Supplies, Ltd., had had another successful year, and the completion of the new lamp factory had enabled them to cope with the increased demand for lamps for general lighting. The sales of rubber wires showed a marked increase. As mentioned last year, that company was now marketing a complete range of domestic appliances. The order sheet for the first four months of the current year showed a large increase over the corresponding period last year, and with the work in hand should keep the works fully occupied.

The Telephone Manufacturing Co., Ltd., held its annual meeting on May 23rd when Mr. F. T. Jackson (chairman and managing director), who presided, said that orders received in 1937 showed an increase of 8 per cent. over those for 1936, and the works output had increased by 13 per cent. For the first four months of the current year orders received showed a substantial improvement as compared with the corresponding period of 1937. Their bakelite plant had been working to full capacity for the whole year, and the condenser plant had also been well employed, the increase in orders being 66 per cent. as compared with 1936. Further progress had been made with the manufacture of their "Temco" clocks, orders showing an increase of 68 per cent. During the year they had designed and put into production a new synchronous motor. Their marine department had had a satisfactory year, the order book showing an increase over the previous year. During 1937 they had spent considerable sums on the development of telephone ancillary apparatus. Orders for new apparatus increased during the year by 59 per cent. as compared with 1936, and had expanded still further in the first four months of the current year. Their subsidiary companies had made good progress, and the P. H. British Electrical Works was being merged with their company in order that they could secure unification of control in all manufacturing operations.

The Cawnpore Electric Supply Corporation, Ltd.—Presiding at the annual meeting on May 24th Mr. K. A. Scott-Moncrieff (chairman) said that the year under review had been a particularly trying one for their agents and staff in Cawnpore. Labour troubles had been acute on several occasions—although they had no trouble with their own staff—and these troubles continued. There was also an acute shortage of coal which reduced them at one time to ten days' supply and on top of that came the extra work of installing and trying out the new plant. On the other hand, their business was expanding in a satisfactory manner. The number of consumers increased by 9 per cent., and the connections to the mains by 12½ per cent. The output increased by only 6 per cent., but would have been considerably greater had it not been for the strikes of the textile workers. During the year, in spite of a material rise in the cost of coal, they had made considerable reductions in their charges and they hoped that when the new plant was in successful operation some further reductions would be made.

Pressed Steel Co., Ltd.—In the course of his speech at the annual meeting held on March 20th, Major A. Pam (chairman), said that the "Prestcold" refrigerator position improved during the year. The new models for domestic use had had a favourable reception in the home market as well as the export market. The total sales of all makes of domestic refrigerators, however, were not up to expectation. Competition had been keen, especially from the United States. Their sales of "Prestcold" commercial refrigerators increased substantially over the previous year and this increase continued.

Callender's Cable & Construction Co., Ltd., reports a gross profit for 1937 of £924,990, as compared with £833,640 in the preceding year, and a net profit of £621,489 (against £561,866). From this the following provisions have been made: Depreciation of plant and machinery, £60,000; income tax, £80,000; N.D.C., £20,000; debenture interest, £13,500; and the preference dividends, £56,000. The balance available is £391,989, to which is added £397,817 brought in, making £789,807. The final dividend on the ordinary stock is 10 per cent., making 15 per cent. for the year, and a special cash bonus of 5 per cent. is paid. A similar distribution was made for 1936. The report states that a general increase has been experienced in the orders for the company's mains of every class and also in the demand for light castings which are manufactured at the Willenhall works, and additional land and buildings have had to be provided there. The export trade has also expanded satisfactorily. The Anchor Cable Co., Ltd., has experienced a substantial increase in its turnover. Meeting: June 15th.

Richard Johnson & Nephew, Ltd.—Presiding at the annual meeting on May 24th, Mr. M. A. T. Johnson said that at the last meeting he mentioned that they would embark on the new period with a full order book, but that they must be prepared for less prosperous conditions. Before August the abnormal influx of orders had abated, although this did not manifest itself in the works until the beginning of 1938 owing to arrears which had accumulated. By this time new orders had diminished and throughout the remainder of the period orders had continued at a low level. The two main factors were panicky buying, caused by advanced prices and long delivery

terms, and the general incentive to caution consequent on world conditions. The rationing scheme for steel did not work out satisfactorily for them and after it had been in operation for two months they were already in deficiency to the extent of 25 per cent. of their quota. Fortunately the position gradually began to straighten itself out as the influx of orders began to dwindle, until early in the new year the shortage had virtually ceased to exist. During the year an important step was taken by the wire trade in the formation of the British Steel Wire Industries Association, a central body co-ordinating all the sections of the wire trade under one head. There was no real change to report as regards the non-ferrous section of their business. The demand had been good on the copper side when it was considered that this industry was over-produced. They had also continued to receive their share of what little business remained to be placed in steel-covered aluminium conductor. During recent years a considerable sum of money had been expended in modernising the Ambergate works, and the directors had before them certain plans for further modernisation which would be embarked upon as the opportune moment arose. They were this year introducing a week's holiday with pay for all men in their employ, and they were appropriating £10,000 out of the year's profits for the creation of a special reserve to this intent.

Telephone Properties, Ltd., reports a net profit for 1937 of £42,741, as compared with £38,735 for 1936, to which is added £19,120 brought in, making £61,861. It is proposed to pay a dividend of 5 per cent. on the ordinary stock, plus a bonus of one per cent. (against nil), and to carry forward £26,674. During the year part of the company's holding of the subsidiary company's 8 per cent. mortgage bonds was sold in Venezuela on approximately a 6 per cent. basis, which will improve the position of the subsidiary. The proceeds of the sale received were applied in repayment of secured loan and in redemption of part of the issued 6 per cent. first mortgage debenture stock of the Properties Co. Meeting: June 1st.

The Delhi Electric Supply & Traction Co., Ltd., reports a net revenue for 1937, including profit on exchange and miscellaneous income, of £52,689, as compared with £59,180 in the preceding year, and after deducting administration charges (£5,323) and adding £27,936 brought in, a sum of £75,302 is available. Depreciation and renewals reserve receives £12,000, British and Indian tax £12,000, and general reserve £11,839. The final dividend is 7 per cent., making 11 per cent. for the year (against 12 per cent.). and £17,463 is carried forward. The report states that the fall in revenue is due to the reduction in charges which took effect on January 1st, 1937.

Cable & Wireless (Holding), Ltd.—Presiding at the annual meeting on May 24th Lord Pender (governor) said that the capital reconstruction, which was approved last May, received the sanction of the High Court and became effective on July 7th, 1937. There were over 6,500 individual holders of £10 or less of the 4 per cent. cumulative funded income stock, and over 12,000 who owned £25 or less. The directors had therefore decided to make an offer next month to all holders of this stock of £25 or under to redeem their stock at par. Such action would result in an economy. With regard to the operating company, Cable & Wireless, Ltd., a good deal of work had been carried out during 1937 in connection with the reorganisation and extension of its world-wide system. In Cyprus the development of the telephone services had been satisfactory, while in Hong Kong the commercial radio services of that Colony had been taken over as from January 1st, 1938. In the other parts of the system the radio-telephone services had been extended, while airway wireless services were being steadily extended. The business in the West Indies was being consolidated in the hands of a wholly owned subsidiary, Cable & Wireless (West Indies), Ltd. A satisfactory agreement had been concluded with the Portuguese Administration providing for a reduction in taxation on cable traffic. Lord Pender then dealt with the negotiations which have recently been concluded with the Governments of the United Kingdom, the Dominions, India and the Colonies, particulars of which were given in our last issue.

The Brush Electrical Engineering Co., Ltd., proposes to reduce its issued ordinary capital by £366,396 to £122,132, by cancelling 75 per cent. The authorised capital is £600,000, of which £488,523 15s. 10d. ordinary stock and 290 ordinary shares of 1d. have been issued. The unissued 26,753,280 ordinary 1d. shares will be converted into 111,472 ordinary £1 shares and the authorised capital restored to £600,000 by creating 366,396 £1 shares. Of the £366,396 reduction of capital, £341,970 will be utilised to write off the whole debit balance at December 31st, 1937, of £99,983, and £241,987 of the book value (£436,229) of land, buildings and plant. The remaining £24,426 of the capital cut will be used to create a capital reserve to cover the expenses of reorganisation. On the scheme becoming operative, the company will offer 150,000 ordinary £1 shares to holders of ordinary and debenture capital for cash at par. Subscribers will be granted the option to acquire during a five-year period new shares at par in the proportion of one for every three shares subscribed. When the new 150,000 ordinary shares have been allotted the company will create £150,000 5¼ per cent. prior lien debenture stock. £100,000 of which will be issued to the R.E.D. Trust for £99,000 cash. These proposals, if carried through, will provide the company with approximately £100,000 additional working capital. Class meetings, the annual meeting and an extraordinary meeting will be held on June 14th.

E. K. Cole, Ltd., report a net profit for the year ended March 31st of £17,953, as compared with £87,517 in the preceding period of ten months, to which is added £29,615 brought in and £20,000 transferred from taxation reserve, making £67,568 available. It is proposed to pay a dividend of 10 per cent. on the ordinary shares and a participating dividend of 3 per cent. on the cumulative participating preferred ordinary shares (making 10 per cent. for the year). For the preceding period 30 per cent. was paid on the ordinary shares. After placing £5,000 to employés' fund a balance of £25,044 is carried forward. The directors state that during the past year the radio industry has felt the effects of a contraction in the spending power of the public, which is reflected in the profits. The company's new developments, which continue to make progress, have required increased expenditure, the benefit of which should accrue in future years. Meeting: May 31st.

The Dubilier Condenser Co. (1925), Ltd., reports a profit for the year ended March 31st of £8,597, as compared with £31,364 for 1936-37, to which is added £11,591 brought in. Tax reserve receives £1,000 and it is proposed to pay an ordinary dividend of 5 per cent. (against 20 per cent. on smaller capital), leaving £9,148 to be carried forward.

Glenfield & Kennedy, Ltd., report a net profit for the year ended March 31st of £78,259, as compared with £95,817 in the preceding year. The directors state that the major portion of the decrease in profits is due to unforeseen expenditure beyond the control of the company, such as wages for holidays, N.D.C., and the fall in investment values. The ordinary dividend for the year is maintained at 15 per cent. by the final payment of 5 per cent., and a bonus of 5 per cent. Staff pension fund receives £4,871 and reserve £10,000. It is proposed to create a dividend equalisation fund with a first contribution of £40,000. The balance carried forward is £33,842 (against £65,174 brought in).

Pye, Ltd., reports a profit for the year ended March 31st (subject to completion of audit) of £119,321, as compared with £139,691 in the previous year. The dividend on the deferred ordinary capital is 25 per cent. (actual), less tax. Last year, in addition to a 125 per cent. dividend on the £33,800 deferred, a capitalised bonus of 400 per cent. was distributed.

Companies to be Struck off the Register.—The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary:—Electrical & Radio Products (1931), Ltd.; Ideal Radio Supplies (London), Ltd.; Thames Valley Radio Service, Ltd.; Ward Electrical Co., Ltd.

The Kalgoorlie Electric Power & Lighting Corporation, Ltd., reports a profit for 1937 of £31,543, as compared with £26,395 for 1936, to which is added £10,890 brought in. After providing £3,694 for income tax and N.D.C., allocating £10,000 to depreciation reserve, and writing off new share issue expenses, it is proposed to pay a final ordinary dividend of 4½ per cent., making 7½ per cent. for the year (same on smaller capital), and to carry forward £11,463.

The Electrical Finance & Securities Co., Ltd., is paying a final dividend of 5 per cent., making 10 per cent. for the year, plus a bonus of 2½ per cent. (same).

The Sphere Investment Trust reports a net profit for the year ended March 31st of £66,750, as compared with £58,973 in the previous year, to which is added £17,453 brought in. The ordinary dividend is maintained at 5 per cent., and £35,756 is carried forward.

Telephone Rentals, Ltd., has declared a final dividend of 6 per cent., making 10 per cent. for the year. This is at the same rate as last year, but the present distribution is on increased capital.

Keith Blackman, Ltd., have announced a dividend of 20 per cent. on the old ordinary shares for the year ended March 31st (same). The new ordinary shares rank for a quarter of this rate, covering the period January 1st to March 31st, 1938.

The Electrical Distribution of Yorkshire, Ltd., has placed privately £500,000 3¼ per cent. redeemable debenture stock, 1955-1965.

Stocks and Shares

TUESDAY EVENING.

GENERAL conditions in the Stock Exchange markets, after being overcast by the recurrence of apprehension in connection with Czecho-Slovakia, were sensibly relieved by the passing of this cloud. Nevertheless, a feeling of caution is noticeable in the attitude of investment towards most of the Stock Exchange markets at the present time. The Whitsun holidays are just ahead, and the impression prevails that the Government cannot remain out of the market for much longer without raising a substantial loan. These are two of the factors making for restriction of business.

At the moment, the most popular markets are those for gold mining shares, lively speculation having sprung up in various directions. In the United States the situation shows little, if any, change for the better, trade and industry being, colloquially speaking, under the weather. The Americans are hopeful of a trade recovery during the autumn, but meanwhile the present-day pointers to business activity are far from favourable. As one example of this, it may be mentioned that the domestic factory sales of motor cars in the United States last month totalled 219,314, as compared with 536,159 in April, 1937.

Gilt-edged

After the conspicuous failure of the L.C.C. to attract subscriptions for its new loan, the success of the Kent Corporation's smaller issue did something to restore good feeling in a somewhat uncertain gilt-edged market. For the time being, it is understood, the market will be closed to further Corporation issues. Inevitably, this has been construed by some people as a preparing of the pitch for Government borrowing, talk of this kind being always ready to make itself heard on the smallest encouragement. On the week, the prices of Government stocks are unaltered. There have been no changes of quotable dimensions in Central Electricity Board issues for quite a time. London Passenger Transport senior stocks are ex dividend. Up to date the devaluation of the franc appears to have put no serious pressure on gilt-edged stocks through the repatriation of French funds.

Cable and Wireless

No one had expected to find any particular encouragement in the Cable and Wireless traffics index for April, but the market was dispirited to find that the figure was practically equal to the lowest figure previously recorded for that month. In consequence, the price of the holding company's ordinary stock sagged to 53, the lowest point touched this year. The preference dropped to below par. Since from now on the indices will begin to reflect the introduction of the new flat rate for inter-Empire communications, interest in the coming figures will be keenly alive to see the effects of this bait on the volume of new business. For the success of the new scheme the volume will, of course, have to grow sufficiently to outweigh a cut in charges calculated to save users of the system about half a million pounds annually. An encouraging pointer was given at this week's annual meeting of the company, at which mention was made of an unprecedented volume of fresh traffic, apparently stimulated by the cheaper rates. Holders of small amounts of funded income stock received in satisfaction of preference dividend arrears, will doubtless be glad to take advantage of the offer to redeem amounts of £25 or less of the stock at par.

Equipment and Manufacturing

Having regard to the lack of positive encouragement from the news of trade at home or abroad, the industrial markets might claim to be showing a tolerably steady front to conditions under which weakness would be excusable. With the flow of business in stocks and shares reduced to a mere trickle, it is inevitable that the small amount of selling always in progress should, without support to counteract it, depress prices. In the market for electrical equipment shares there are fairly substantial losses in British Insulated, Johnson and Phillips, Callenders, and Lancashire Dynamos. Declines are shown by General Electrics at 70s. 6d., Associated Electrical at 37s. 6d., and English Electric at 29s. Laurence Scott are reactionary at 10s., the new shares being 6d. premium over the issue price of 9s. 6d. Also on the dull side are Crabtree Electricals at 24s. 6d., and Walsall Conduits at 25s. 6d. Dividend hopes are responsible for firmness in Revo Electrics at 36s. Rumours, now denied, of developments affecting Ismay Industries left the shares unchanged at 4s.

Brush Electrical

The papers are now issued by the Brush Electrical Engineering Company, Ltd., giving notice of an extraordinary general meeting, to be held on June 14th, for the purpose of considering resolutions for rearranging the capital. The proposed scheme of arrangement is complicated as well as drastic, but the company, according to the circular issued by the Board, is increasing its turnover. The trading for the accounting period of six months, which ended on December 31st last, showed a small profit. Underwriting of the new ordinary shares has been arranged with the R.E.D. Trust, Ltd., upon certain conditions. The directors claim that the proposals are equitable and in the interests of the classes of persons affected. The price of the ordinary stock is 2¼ points higher at 27½.

Radio Dividends

Judging from the Pye Company's dividend and profits, it appears that the difficulties commonly supposed to have beset the radio trade are not universal. Pye's dividend of 25 per cent. on the deferred stock has to be paid on capital increased since last year, when 125 per cent. was paid, by a 400 per cent. capital bonus and by a further issue six months ago; so that the present distribution, amounting to a repetition of the previous rate, carries on an excellent dividend record. Accompanying the report is an announcement of negotiations with an American company, which will apparently give Pye important manufacturing rights. The 5s. units stand at 10s., to yield 12½ per cent. on the 25 per cent. dividend.

The "Ekco" dividend of 10 per cent., which is being paid out of reserves, goes against 30 per cent. for last year and 40 per cent. for the year before. The ordinary shares stand at about 4s. 6d. Dubilier Condenser's profits are reported to have suffered from a slowing-down in the demand for wireless sets during the latter half of the year, and the dividend is halved at 5 per cent. The 1s. shares have changed hands at a few pence below the par value. Doubts concerning the coming Electric and Musical Industries dividend have depressed the price of "Emmies" to 10s. 9d.

Miscellaneous Matters

Apparently the addition of a 1 per cent. cash bonus to the 5 per cent. dividend declared by Telephone Rentals was expected, for the price of the shares remained at 8s. 9d. Marconi-Marines have risen from 23s. 9d. to 24s. 6d. by reason of the good impression made by the chairman's recent speech. The market in electricity supply shares is steadiness itself, there being scarcely a quotable price movement throughout the list. British Electric Traction deferred, at 975, ex dividend, and Tillings, at 42s., reflect the dulness of traction issues. Coming on top of the discouraging railway traffic receipts, the unions' claims, which would cost the main lines about three million pounds annually, have brought further concern to the home railway market. American markets have an air of resignation while waiting, as noted above, for some approach towards a truce between the Administration and the business community. Rubber shares and others connected with commodities, are suffering under the same anxiety.

Share List of Electrical Companies

	Nom.	Dividend. Previous.	Dividend. Last.	Price May 24.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	63/9	—	4 14 4
City of London	1	7½	7½	34/–	—	4 8 3
Clyde Valley	1	7	8	35/6	—	4 10 2
County of London	1	10½	10½	49/–	—	4 5 7
Edmundson's 7% Pref.	1	7	7	32/–	—	4 7 6
Do. Ord.	1	8	9	38/6	—	4 13 9
Elec. Dis. Yorkshire	1	9	9	42/6	—	4 4 9
Elec. Fin. and Securities	1	12½	12½	48/9	—	5 2 6
Elec. Supply Corporation	1	11	12	51/3	—	4 13 8
Lancs Light and Power	1	7½	7½	33/–	—	4 11 0
Lond. Assoc. Electric	1	—	7	30/–	—	4 13 4
London Electric	1	8	7	35/6	—	3 19 0
London Power Deb. Red.	Stock	5	5	105	—	4 15 3
Metropolitan	1	10	12	50/–	—	4 16 0
Midland Counties	1	7½	8	36/6	—	4 7 8
Mid. Elec. Power	1	8	9	2	—	4 10 0
North Eastern Electric Ordinary	1	6	7	32/–	—	4 7 6
Do. 7% Pref.	1	7	7	31/–	—	4 10 4
Northampton	1	10	10	46/3	—	4 6 7
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	46/3	—	4 6 6
Do. do. 6% Pref.	1	6	6	29/–	—	4 2 9
Scottish Power	1	8	8	36/–	—	4 9 0
South London	1	7	7	32/–	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	18/9	—	8 0 0
Yorkshire Elec.	1	8	8	40/6	—	3 19 0
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	113	—	4 8 6
Do. 1955–75	„	5	5	114	—	4 7 9
Do. 1951–73	„	4½	4½	109	—	4 2 7
Do. 1963–93	„	—	3½	98	—	3 11 5
London Elec. Trans. Gtd.	„	—	2½	92	—	2 14 4
London & Home Counties, 1955–75	„	4½	4½	112	—	4 0 4
London Passenger Transport, A	„	—	4½	116xd.	–¾	3 17 7
Do. do. B	„	—	5	117¼xd.	—	4 5 1
Do. do. C	„	4	4½	77	—	5 10 7
West Midlands Joint Elec. 1948–68	„	—	5	112	—	4 9 3
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	130½	—	6 18 0
Anglo-Am. Tel. Pref.	Stock	6	6	106½	—	5 12 7
Do. Def.	„	1½	1½	26	–½	5 15 2
Cable & Wireless 5½% Pref.	„	4½	5½	99½	–2½	5 10 7
Do. Ord.	„	—	4	53½	–3	7 11 0
Do. Income	„	—	—	101½	—	3 18 10
Globe Tel. & Tel. Ord.	10	4½*	5½*	14¾	+¼	3 14 7
Do. do. Pref.	10	6	6	13½	—	4 9 0
Great Northern Tel.	10	20	20	35	—	5 14 2
Marconi-Marine	1	10	7½	24/6	+9d.	6 2 4
Oriental Telephone Ord.	1	12*	12*	2¾	—	4 7 3
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	6/3	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	13	—	—
British Electric Traction Def. Ord.	„	5	5	925xd.	—	—
Do. do. Pref. Ord.	„	8	8	160xd.	+3	5 0 0
Brazil Traction	$100	70 cts.	$1	10⅜	–⅜	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	99½	—	5 0 6
Mexican Light Common	$100	Nil	Nil	1	—	—
Do. 1st Bonds	$500	5	5	25	—	—
Victoria Falls Ord.	1	20	12	3½	—	3 16 10
West Riding	1	6½	10	2½	+1/16	4 9 0
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	15	15	1¾	—	8 11 6
Assoc. Elec. Ord.	1	10	10	37/6	–6d.	5 6 8
Do. Pref.	1	8	8	37/–	–1/–	4 6 6
Babcock & Wilcox	1	10	10	39/6	—	5 1 3
British Aluminium Ord.	1	10	12½	51/–	—	4 18 2
British Insulated Ord.	Stock	20	20	4¼	–⅛	4 14 1
Brush Ord.	Stock	Nil	Nil	27½	+2½	—
Callender's	1	15	15	4½	–⅛	3 10 6
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord.	5/–	12½	12½	23/9	–1/16	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	7	10	35/–	—	5 14 3
Enfield Cable Ord.	1	25	25	2 3/16	—	—
English Electric	1	Nil	10	29/–	–6d.	6 18 0
Do. Do. Pref.	1	6½	6½	25/6	—	5 2 0
Ericsson Tel.	5/–	25	25	38/9	—	3 4 6
Ever Ready	5/–	45	35	22/–	–6d.	7 19 2
Ferranti Pref.	1	7	7	27/6	—	5 2 0
G.E.C. Pref.	1	6½	6½	32/6xd.	+6d.	4 0 0
Do. Ord.	1	15	17½	70/6	–1/–	4 19 4
Henley's	5/–	15	20	20/–	—	5 0 0
Do. 4½% Pref.	1	4½	4½	1½	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	10	12½	38/9	–⅛	6 9 0
Lancashire Dynamo	1	20	25	58/9	–3/9	8 10 0
Siemens Ord.	1	7½	7½	23/9	—	6 6 4
Telegraph Construction	£1	7½	10	37/6	—	5 6 8

* Dividends are paid free of Income Tax

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1936

20232. "Controlling of electric generators." Allgemeine Elektricitäts-Ges. July 23rd, 1935. (Addition to 460996.) (483729.)

20419. "Systems for the reception and reproduction of sound." L. F. Savage and C. J. Francis. July 23rd, 1936. (483730.)

20613. "Electric drives for loom shuttles." G. Eisselt. July 25th, 1936. (483816.)

25095. "Thermionic amplifier circuits." W. S. Percival. September 15th, 1936. (483732.)

25843. "Means for supplying current to d.c. electric motors." English Electric Co., Ltd., and C. E. Baston. September 23rd, 1936. (483990.)

25902. "Thermionic amplifier circuits." W. S. Percival. September 24th, 1936. (483734.)

28394. "Electrical insulating tape and the utilisation thereof." Siemens Bros. & Co., Ltd., and A. H. Roberts. October 19th, 1936. (483911.)

28760. "Electric motors." British Thomson-Houston Co., Ltd., and J. H. Walker. October 22nd, 1936. (483913.)

29026. "Electric-lamp stands for use in workshops." A. Matthies. October 26th, 1936. (483738.)

29037. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd. October 25th, 1935. (483826.)

29094. "Electrical control apparatus for radio transmitters and the like." Marconi's Wireless Telegraph Co., Ltd., and N. H. Clough. October 26th, 1936. (483740.)

29096. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd., and G. F. Brett. October 26th, 1936. (483827.)

29172. "Direct-current generators." General Electric Co., Ltd., and E. C. Davies. October 27th, 1936. (483743.)

29175. "Oscillation generators." Standard Telephones & Cables, Ltd., W. Lawrence and M. M. Levy. October 27th, 1936. (483918.)

29176. "Magnetic cores for loading-coils and other electromagnetic devices." Standard Telephones & Cables, Ltd., and S. E. Buckley. October 27th, 1936. (483919.)

29182. "Electric disconnecting switches." British Thomson-Houston Co., Ltd. (Allgemeine Elektricitäts-Ges.) October 27th, 1936. (483996.)

29281. "Telephone systems and the like." Telephone Mfg. Co., Ltd., and L. H. Paddle. October 28th, 1936. (483922.)

29330. "Electric oscillatory circuits." M. Geiger and Telefunken Ges. für Drahtlose Telegraphie. October 28th, 1936. (484157.)

29331. "Thermionic-valve amplifying circuits." W. S. Percival. October 28th, 1936. (483744.)

29332. "Circuits for generating deflecting waveforms for cathode-ray tubes." Telefunken Ges. für Drahtlose Telegraphie. October 28th, 1935. (483999.)

29339. "Electrolytic process for the colouring of aluminium or zinc." L. T. Gmach. October 28th, 1936. (484158.)

29345. "Electron-discharge device arrangements." Marconi's Wireless Telegraph Co., Ltd. October 28th, 1935. (484160.)

29371. "Cathode-ray transmission apparatus for direct television and for the transmission to a distance of films which may be sound films." A. Castellani and Safar-Soc. Anon. Fabricazione Apparecchi Radiofoniche. October 28th, 1936. (484003.)

29403. "Electrical circuit-interrupter operated by vibration of a diaphragm." B. S. Cooper and L. Bluston. October 29th, 1936. (484162.)

29417. "Construction of electrical coils." Pirelli-General Cable Works and A. Bacci. October 29th, 1936. (483829.)

29431. "Electric vapour discharge tubes." K. Nowak. October 29th, 1936. (484004.)

29527. "Electric discharge devices." Marconi's Wireless Telegraph Co., Ltd. October 30th, 1935. (484099.)

29542. "Plug-and-socket connectors for electrical purposes." General Accessories Co., Ltd., and P. A. Johnson. October 30th, 1936. (484005.)

29553. "Wave-amplifying systems." Standard Telephones & Cables, Ltd., and A. H. Roche. October 30th, 1936. (484102.)

29561. "Treating material electroplated with tin." British Thomson-Houston Co., Ltd., R. Dumas and H. Marston. October 30th, 1936. (484103.)

29562. "Magneto-electric machines." British Thomson-Houston Co., Ltd., and L. Griffiths. October 30th, 1936. (484104.)

29585. "Magnetic cores and methods of producing them." Associated Electric Laboratories, Ltd. December 30th, 1935. (484106.)

29802. "Electric drum switches." W. T. Gray, G. H. Millar, and Metropolitan-Vickers Electrical Co., Ltd. November 2nd, 1936. (484116.)

30059. "Devices for supporting and retaining in position globes, reflectors and the like for electric lighting, heating, and other appliances." F. W. Leevers, and Metropolitan-Vickers Electrical Co., Ltd. November 4th, 1936. (484008.)

30060. "Devices for supporting and retaining in position globes, reflectors and the like for electric lighting." N. Dennes and Metropolitan-Vickers Electrical Co., Ltd. November 4th, 1936. (483837.)

30165. "Magnetron electron-discharge devices and arrangements incorporating the same." Telefunken Ges. für Drahtlose Telegraphie. November 5th, 1935. (483839.)

30225. "Electric tumbler switches." J. B. Tucker. November 6th, 1936. (483840.)

30272. "Apparatus for receiving a television or like image on a receiving screen." General Electric Co., Ltd., and A. Bloch. November 6th, 1936. (483841.)

30788. "High-pressure metal vapour electric discharge lamps." General Electric Co., Ltd., H. G. Jenkins, J. W. Ryde and G. H. Wilson. November 11th, 1936. (483846.)

31429. "Electric circuit-breakers with arc-extinguishing means." F. Strauss (née Ruffel). November 25th, 1935. (484011.)

32026. "Electrically insulating gas-tight seals, more particularly for metal-vapour electric convertors." General Electric Co., Ltd., and E. Gallizia. November 23rd, 1936. (483931.)

33228. "Thermionic-valve apparatus." J. E. Jones, J. O. G. Rhys-Barrett, and Plessey Co., Ltd. December 3rd, 1936. (484013.)

33251. "Manufacture of collector shoes for electric rail traction." H. Young and Harland & Wolff, Ltd. December 4th, 1936. (483933.)

33310. "Electrolytic processes for the manufacture of aluminium." D. Gardner. December 4th, 1936. (484014.)

34440. "High-frequency communicating systems." Standard Telephones & Cables, Ltd. December 18th, 1935. (Cognate application 34441/36.) (484016.)

34840. "Frequency-changing apparatus." General Electric Co., Ltd., and E. P. George. December 18th, 1936. (484017.)

1937

1138. "Electric insulators." Bullers, Ltd., and H. C. R. Dagnall. January 14th, 1937. (484020.)

1237. "Method of and means for electric transmissions of pictures and for television." J. Briza. January 15th, 1937. (483935.)

1519. "Electric liquid-breakers." General Electric Co., Ltd., and P. H. Coales. January 18th, 1937. (483764.)

3382. "Brush-gear for commutator dynamo-electric machines." G. A. Juhlin, and Metropolitan-Vickers Electrical Co., Ltd. February 4th, 1937. (483871.)

4137. "Radio receivers for direction-finding or course-indicating systems." Radio Transmission Equipment, Ltd., and C. E. G. Bailey. February 11th, 1937. (483768.)

4640. "Electric-discharge lamps." General Electric Co., Ltd. (Patent Treuhand Ges. für Elektrische Glühlampen) February 16th, 1937. (484023.)

5970. "Process of and machine for making stem units for electrical apparatus." Arcturus Radio Tube Co. February 29th, 1936. (483771.)

6064. "Electric-discharge devices whose filling comprises alkali-metal vapour." General Electric Co., Ltd. (Patent Treuhand-Ges. für Drahtlose Telegraphie). March 1st, 1937. (483772.)

9917. "Thermionic valve amplifiers." C. Lorenz Akt. Ges. April 8th, 1936. (483882.)

10159. "Radio transmitting systems." C. Lorenz Akt. Ges. April 9th, 1936. (483883.)

13012. "Electron-discharge tubes for use for ultra-short wave radiation." Telefunken Ges. für Drahtlose Telegraphie. May 6th, 1936. (483888.)

14720. "Multi-break electric circuit-breakers." Westinghouse Electric & Mfg. Co. May 29th, 1936. (483784.)

15361. "Circuits for multiplying or dividing the frequency or high-frequency and ultra-high frequency oscillations." Naamlooe Vennootschap Philips' Gloeilampenfabrieken. June 5th, 1936. (483890.)

17783. "Amplifier systems for radio receivers." Hazeltine Corpn. July 21st, 1936. (484137.)

19333. "Arrangements for supplying direct-current machines through convertors employing grid-controlled electric discharge devices." Siemens-Schuckertwerke Akt.-Ges. July 11th, 1936. (483897.)

20377. "Apparatus for the electrolytic decomposition of liquids." L. Schirmer. July 22nd, 1937. (484054.)

21043. "Systems for the control of electric motors running at related speeds." British Thomson-Houston Co., Ltd. July 29th, 1936. (483791.)

23335. "Directive radio systems." Standard Telephones & Cables, Ltd. September 11th, 1936. (483797.)

24527. "Electromagnetic relays." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 11th, 1936. (484060.)

27777. "Control of electric generators driven by the internal-combustion engines of motor vehicles." S. S. Guy and R. Dean-Averns. November 13th, 1936. (Divided out of 478614.) (484066.)

27847. "Electric-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 7th, 1937. (483968.)

28578. "Sockets or contacts for electric plug or pin couplings." Carr Fastener Co., Ltd., and G. Wagstaff. October 2nd, 1937. (484068.)

30128. "Multi-lever electric interlocking mechanisms." Vereinigte Eisenbahn-Signalwerke Ges. November 17th, 1936. (483972.)

32407. "Artificially-cooled high-pressure mercury-vapour discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 27th, 1936. (484143.)

34562. "Luminous tube signs." C. R. Osterlind. December 16th, 1936. (483979.)

34919. "Electron-discharge device arrangements." Marconi's Wireless Telegraph Co., Ltd. October 28th, 1935. (Divided out of 484160.) (484078.)

1938

3152. "Tubular electric resistance heating elements." C. B. Backer. February 1st, 1938. (484148.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from May 18th:—

Telesalk. No. 582388. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—Webster Electric Co., Racine, Wis., U.S.A. (British representatives: Dicker, Pollak, Mercer, Tench and Meyer, 20-23, Holborn, E.C.1.)

Daimon. No. 584111. Class 8. Philosophical and scientific instruments and apparatus for useful purposes.—Elektrotechnische Fabrik Schmidt & Co., Gesellschaft, Berlin. (British representatives: Boult, Wade and Tennant, 111-112, Hatton Garden, E.C.1.)

Majestic. No. 585015. Class 10. Electric clocks.—Madison Appliances Ltd., Windsor House, Victoria Street, S.W.1.

Leda (lettering and design). No. 583696. Class 13. Electric lighting fittings, &c.—W. C. Youngman, Ltd., Wandsworth Works, Wandsworth Road, S.W.8.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Houses (40), with electrical work, Bridge of Don, for T.C.; E. L. Williamson, architect, 154, Union Street.

Addington.—Eleven shops and flats, Lodge Lane; Murrell & Piggott.

Ashbourne (Derbyshire).—Houses (58), Clifton Road site; D. Powell, U.D.C. surveyor.

Birkenhead.—Houses (176), Storeton Road, Barnston; A. J. Milner, Heswall.

Birmingham.—Houses, near Kingstanding Road; Davis Estates, Ltd., 346, Kilburn High Road, London, N.W.6. Houses, Yarningale Road, Moseley; Jones, Mackay & Croxford, Edmund Street, Birmingham. Block of flats, &c., Alcester Road, Moseley (£225,607); H. J. Manzoni, city engineer and surveyor, Council House, Birmingham.

Blackhall (Co. Durham).—Houses (18), Leaholme Terrace; P. Taylor.

Blackpool.—Shops and offices (£200,000), Market site; borough surveyor.

Blaydon-on-Tyne.—Houses (112), Barlow, Holgarth and High Spen; U.D.C. surveyor.

Brighton.—News theatre, café, shops and flats, North Street; A. G. MacDonald.

Buckhurst Hill.—Clinic (£3,150); A. R. Scrivener.

Buckingham.—Houses (62); G. B. Chilvers, borough surveyor.

Caernarvon.—Houses (80) two Council estates; borough engineer.

Carlisle.—Schools, Carlisle (£35,000), for St. Patrick's R.C. Authorities; R. Mercer, architect, 11, Chapel Street, Preston.

Carnoustie.—Houses (28), Kinloch Street; burgh surveyor, Council Chambers.

Cassop.—Houses (23); Durham R.D.C. surveyor.

Chertsey.—Cinema, London Road, for Rowland Estates, Ltd.; H. Weston, architect, 81, Chester Square, London, S.W.1.

Chipping Norton.—Houses (20), Churchill Road site; borough surveyor.

Colchester.—Depôt (£22,852); borough engineer.

Coseley (Staffordshire).—Cinema, Vicarage Road; McKeand, Smith & Co., builders, Showell Road, Wolverhampton.

Cowdenbeath (Fifeshire).—Houses (160); burgh surveyor.

Dawlish.—Houses, Oak Hill and Cofton; U.D.C. surveyor.

Derbyshire.—Extensions to Mining and Technical Institute, Clown (£15,960), for the E.C.; county architect, Derby.

Dorset.—Police buildings, Poole (£31,764), for the C.C.; F. C. White, Ltd., contractors, Havilland Road, Boscombe, Bournemouth.

Douglas (Lanarkshire).—Houses (52) Taylor's Park for Scottish Special Areas Housing Association Ltd.; A. H. Mottram, architect, 14, Frederick Street, Edinburgh.

Dover.—Houses (33), extension of Stanhope Road and Maurice Road, for S. Fitzmaurice; J. L. Seaton-Dahl, architect, Radnor Chambers, Folkestone.

Dudley.—Public buildings and fire station, Pier Street (£50,000); borough surveyor.

Ealing.—Extensions to Coston Girls' school, for the E.C.

Edinburgh.—Premises for Mackay, Ltd.; Charles E. Tweedie & Son, architects, 54, Frederick Street.

Essex.—Children's hospital, Crowlands site, Chadwell Heath (£558,979), and premises for High School for Girls, Colchester (£50,219); county architect.

Falkirk.—Cinema (£38,000); Odeon (Falkirk), Ltd., cinema proprietors, Birmingham.

Gainsborough.—Cinema, Spital Terrace, for a local syndicate; J. Owen Bond & Sons, architects, 26, Tombland, Norwich.

Gateshead.—Houses, Split Crow Road; borough engineer.

Glasgow.—Garage for 150 vehicles (£20,000), extension to Knightswood garage (£12,500) and workshop and training school (£70,000), for Corporation Transport Department; the manager. Reconstruction of Albert Dance Hall (£10,000); Bailie Warren, proprietor.

Halesowen.—Houses (36), Rosafield Avenue; A. H. Field & Co.

Haydock.—Houses (124), Church Road, for R.D.C.; W. Ince, builder, Kenyons Lane.

Heanor.—Houses (106), Langley and Condor estates; U.D.C. surveyor.

Hendon.—Additions to factory, Cricklewood Lane, for Price's Patent Candle Co., Ltd. Houses (33), Oakhampton Road; Sharon Development Co., Ltd. Houses (28), Engel Park; Clark & Gardiner, Ltd.

Hinckley.—Operating theatre, annexes, kitchen block and staff dining-rooms, Hinckley and District Hospital; F. B. Smith, secretary, Mount Road.

Hyde.—Houses (20), Kingston estate; J. Hall. Houses (120), Walker estate; J. Gerrard & Sons, Ltd.

Isleworth.—School, Smallbury Green (£37,075), for the E.C.

Leamington Spa.—Maternity block, Warneford General Hospital, for the Board of Management.

Leeds.—School, Chapel Allerton (£46,857); city surveyor.

Leyland.—Houses (80); D. B. Gray & Partners, architects, Westminster Bank Chambers, Lord Street, Southport.

Lincoln.—Houses (152), Monks Tower estate (£59,906), for the Town Council.

London.—(Forest Hill).—School (£58,275); L.C.C. architect, County Hall, Westminster Bridge Road, S.E.1. (St. Pancras).—Extensions to Stanley school (£28,119); J. & C. Bowyer, Ltd., Haynes Lane, S.E.19. (Southwark).—Extensions to Borough Polytechnic (£28,000); governors.

Luton.—Rebuilding factory, Skefco works, for Skefco Ball Bearing Co., Ltd.; T. & E. Neville, builders, 30, Castle Street.

Lynemouth (Northumberland).—Houses (68); T. T. Watson, 7A, Bridge Street, Morpeth.

Manchester.—Houses (318), Dane Bank estate, Denton; F. Annable & Sons, builders, 73, Hyde Road, West Gorton.

Middlesbrough.—Houses (56), Tollesby Road; N. Thompson, Ltd., builders, Stonehouse Street.

Middridge (Co. Durham).—Houses (20); John Proud, Ltd., contractors, 195, York Road, West Hartlepool.

Morley.—Houses (38); H. Spensley & Sons, High Street.

Morpeth (Northumberland).—Sports stadium (£43,000); J. K. Perkins, borough surveyor.

Neville's Cross (Co. Durham).—Houses (44), Merry Oaks estate; H. E. Pitts, Ltd.

Newbiggin (Northumberland).—Houses (36), for the U.D.C.; N. and W. Cocknell, builders, Blyth.

Newcastle-on-Tyne.—Houses (28); Marshall, Tweedy and Bowen, architects, Grainger House, Blackett Street. Houses (36), Grace Street, for Northern Housing Development Co.; S. H. Lawson, architect, Emerson Chambers. Houses (13) and shops; Haddon and Hillman, contractors, Huddlestone Street.

New Washington.—Cinema, New Rows; Southgate Cinemas, Ltd.

North Cotswold.—Houses (76); R.D.C. surveyor.

Northumberland.—School, Monkseaton (£10,000), and Wooler (£25,000), for the County E.C.

Nottinghamshire.—School, Selston, for the E.C.; Harris Bros. (Marehay), Ltd., contractors, Marehay, near Derby.

Paisley.—Three blocks of factory buildings, industrial estate, Hillington; Scottish Industrial Estates, Ltd., 29, St. Vincent Place, Glasgow.

Portsmouth.—Houses (474), and shops, Wymering scheme; A. J. Sharp, city architect.

Pwllheli.—Houses (56), Morfa estate; borough engineer.

Queenborough.—Factory, Crundall's Wharf, for Metal Smelting Co., Ltd.

Renfrew.—Central premises for Equitable Co-operative Society (£22,000); the manager.

Repton.—Houses (50); R.D.C. surveyor.

Rugby.—Houses (22), Southbrook Road; British Industrial Homes, Ltd., Montrose Road, Rokeby estate. Houses (68), Rugby Station estate; Davis Estates, Ltd., Brownover.

Rutland.—School, Uppingham (£10,000), for the E.C.; County Education Offices, Station Road, Oakham.

St. Albans.—Houses (136), Cotton Mill Lane; H. C. Janes, Ltd., contractors, Victoria Street.

Sheffield.—Buildings, Division Street (£17,000), for Y.W.C.A.; J. Mansell Jenkinson, architect, 18, Norfolk Row.

Shipley.—Houses (600), Baildon Green, Baildon; J. Kerr, builder, The Knoll estate, Baildon.

Shropshire.—Schools, Dawley, and Newport, for the County E.C.

Skelmersdale.—Cinema, for Vickers Entertainments, Ltd.; A. V. Cunliffe.

Staines.—Cinema with shops, Bridge House Hotel estate, for Associated British Cinemas, Ltd.; Marfix, Ltd., contractors, 102, Albany Street, N.W.1.

Stirling.—Nine blocks of houses, Springbank; Scott & Co. (Builders), Ltd., 116, Hanover Street, Edinburgh.

Stockton-on-Tees.—Development of land (70 building sites) by private enterprise; J. C. Watson, builder, Prudential Buildings.

Sunderland.—Houses (36); Bell Bros., Ltd., contractors, West House, Newcastle Road. Premises for the Wearside Furnishing Co., Ltd.; Stephenson & Gillis, architects, 2, Saville Place, Newcastle-on-Tyne.

Surrey.—Extensions to police stations (£32,865); county architect.

Thornaby-on-Tees.—School; F. Willey, architect, 34, Old Elvet, Durham City.

Tottenham.—Cinema, Scotland Green, for Odeon Cinema Holdings, Ltd.; A. Mather, architect, Leicester Square Chambers, W.C.2.

Tunbridge Wells.—Houses (158), Oak estate; borough engineer.

Tynemouth.—Sports drome and ice-rink (£100,000); Marshall, Tweedy and Bourn, architects, Grainger House, Blackett Street, Newcastle.

Warrington.—Houses (200), Long Lane estate (£70,520); borough surveyor.

Warwickshire.—Development scheme. Weston Colony for Mental Defectives (£117,100), for the C.C.; county architect.

Weardale.—Council offices, Front Street, Stanhope; R.D.C. surveyor.

West Bromwich.—Extensions to Charlemont school (£39,044); borough surveyor.

West Hartlepool.—Aerodrome, Greatham; borough engineer.

Westmorland.—Extensions to Kirkby Lonsdale Grammar school (£11,406), for the E.C.; director of education, Lowther Street, Kendal.

Weston Green (Surrey).—Houses (42), Newlands College site; Coates & Stratton, builders, Tolworth Rise, Tolworth.

Weymouth.—Houses (11) and two shops, Links Road (£14,000); borough engineer. Fire station (£16,700); Whitelock & Co., Ltd. Reconstruction of Market House; Collins & Geanes, architects, Bournemouth.

Willesden.—Factory, offices, &c., Neasden Lane, for Barlow Bros. & Co.; Cripps Construction Co., Ltd., Putney Bridge Road, London, S.W.15.

Wombwell.—Houses (24), Margaret Road; M. E. Taylor, Brendon, Westville Road, Barnsley.

Yorkshire.—School and technical institute, Barnoldswick, for the West Riding E.C.; Education Officer, County Hall, Wakefield.